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# THESIS

## THERMAL ANALYSIS OF PANSAT BATTERIES AND ELECTRICAL POWER SUBSYSTEM

by

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September, 1994

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# THERMAL ANALYSIS OF PANSAT BATTERIES AND ELECTRICAL POWER SUBSYSTEM

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# ABSTRACT

The thermal design of a spacecraft ensures proper heat transfer so all components and subsystems remain within prescribed temperature limits during all aspects of the spacecraft's mission. This thesis develops a point-to-point heat flow model of the Electrical Power Subsystem (EPS) and its associated housing for the Petite Amateur Navy Satellite (PANSAT). The analysis is performed to identify physical locations in the EPS where temperature may exceed the limits established to protect sensitive electronic components, and to define the expected environment of the batteries. The Integrated Thermal Analysis System (ITAS) and a Steady State Thermal Analyzer and Model Builder were used to perform steady state and transient analyses on the EPS; analysis of the batteries was performed using ITAS only. The simulated transient temperatures within the EPS housing remained within limits, but the batteries exceeded specifications. It is suggested that a passive thermal control technique be adapted for the batteries and its design be experimentally validated before flight.

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# I. INTRODUCTION

## A. REASON FOR ANALYSIS

The thermal environment for components within a spacecraft is a function of the irradiation from the sun and earth, internal heat dissipation, radiation from external surfaces to the space sink, and the conductive and radiatitive heat transfer paths between the heat sources and sinks. Thermal control design ensures proper heat transfer so that all components and subsystems remain within prescribed temperature limits during all aspects of the spacecraft's mission.[Larson and Wertz, 1992] Early thermal design forces the determination of operating temperature limits and identifies the power dissipation patterns of components to allow for maximum use of passive thermal control methods.

To build a thermal model of a spacecraft, a knowledge of dimensions, equipment placement and material properties is required. The spacecraft or area to be analyzed is divided into nodes. The nodes are chosen so that the conductive and radiative heat flow paths accurately represent point-to-point heat flows within the spacecraft.

The thermal design of the spacecraft is also highly dependent on the mission and stabilization system of the satellite. Typically unmanned, low earth orbit spacecraft can be controlled passively. Table 1 lists a typical operating environment for electric power system (EPS) components.

The power subsystem typically has the greatest interaction with the thermal control subsystem because all of the dissipated electrical energy within the spacecraft must be radiated into space. The terrestrial batteries to be used in the Petite Amateur Navy Satellite (PANSAT) have even a narrower temperature range than that listed in Table 1: the ideal operational

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| SYSTEM COMPONENT | TEMPERATURE RANGE |
|---|---|
| MILITARY PIECE PARTS FOR INTEGRATED CIRCUITS | -55 TO 125 DEGREES CELSIUS |
| BATTERIES | -6 TO 26 DEGREES CELSIUS |
| SOLAR ARRAY PANELS | -100 TO 100 DEGREES CELSIUS |

Table 1. Temperature Ranges for Some Electrical Power System Components

temperature for charging and discharging is 23 °C. Operations outside the published temperature range will cause the battery cells to degrade and become less efficient. This condition is explained fully in Chapter VI.

PANSAT has a very low power margin and must be able to maximize the power from the solar arrays and batteries. The sunlight and shadow zones of the orbit require that the batteries must operate for 40 percent of the time. There is only one EPS box for PANSAT. Other vital subsystems are redundant ; for example, the Digital Control Subsystem has two fully capable boxes. The batteries within the Electrical Power Subsystem itself are redundant, but must be able to be recharged to full capacity after each use to ensure proper Depth of Discharge. The batteries and the EPS will be discussed more fully in the following chapters.

## B. SCOPE OF THESIS

The purpose of this thesis is to develop a transient thermal model of the Electrical Power System and the associated housing for the Petite Amateur Navy Satellite (PANSAT) . This thesis will also develop a steady state and transient analysis for the preliminary Nickel-Cadmium battery design, identifying any physical locations within the EPS and batteries where temperature limits are exceeded, and offering some recommendations for

passive thermal methods.  Computer generated steady state and transient analyses using radiation, contact conductances and thermal capacitances through the equipment housing and the upper and lower equipment plates of the satellite were used to evaluate temperature ranges at the node points representing physical locations in the structure.  To perform the analysis, circuit board layouts, heat dissipations of components, subsystem materials and cell efficiencies were required.  Inward viewing box geometry was used to physically model the EPS and the battery model.  Two models were used to verify steady state temperatures for the EPS.  The transient analyses used equipment plate temperature profiles obtained from a recent transient analysis of the entire PANSAT structure.

## II.  BACKGROUND

## A.  PETITE AMATEUR NAVY SATELLITE (PANSAT)

PANSAT was initiated in 1989 to provide interdisciplinary educational opportunities in space related areas to prepare postgraduate students for follow on work in space systems acquisition and design, and to develop a cadre of engineers and technicians at the Naval Postgraduate School (NPS) capable of developing and producing space qualified hardware.  The current PANSAT design is the result of five years of research by NPS thesis students and the personnel of the Space Systems Academic Group (SSAG). Preliminary Design Review (PDR) was held in 1993 with the Critical Design Review to be held in late 1994.

The payload will be a direct sequence spread spectrum with a differentially coded, binary phase shift keyed (BPSK) communications system with an operating frequency of 436.5 MHz.  The satellite will relay messages on a user-to-user basis in a simplex mode.  The store and forward communication will allow amateur radio operators to send and receive messages through several short windows daily.[FRD, 1993]

The spacecraft will weigh approximately 150 pounds and is being designed to launch as a secondary platform from the space shuttle as part of the Hitchhiker Program.   PANSAT has no attitude control and is free to tumble.  Operational life is expected to be two years, with three to five minute communications segments per orbital pass.  PANSAT will operate between 28.5° and 51.6° inclination and between 160-220 nautical miles.

The spacecraft consists of five subsystems:  Communication (COMM), Electrical Power, Computer, Structure, and Ground Station Support.   This

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thesis focuses on the Electrical Power Subsystem, where the thermal control functions reside.

The PANSAT structure is Aluminum 6061-T6, built about a main load bearing cylinder connected to a lower equipment plate. The satellite is a tumbler, and since the solar panels will be mounted on the spacecraft skin, maximizing surface area increases power generation. A 26 sided polyhedron was the chosen structural configuration, already demonstrated on a Shuttle launch. A view of PANSAT is shown in Figure 1.
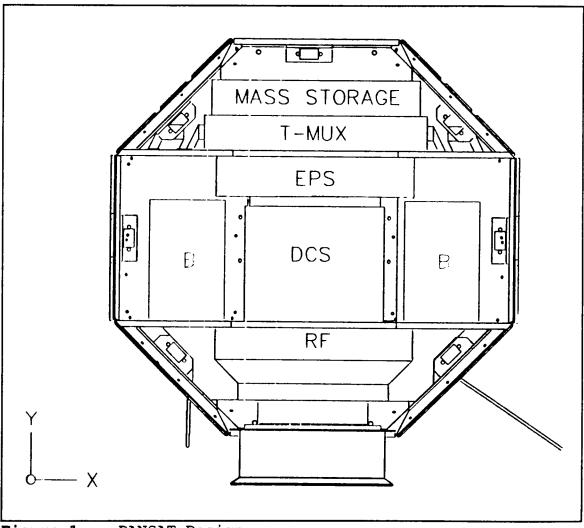


**Figure 1.** PANSAT Design

## B. ELECTRICAL POWER SYSTEM (EPS)

The power to PANSAT is provided by seventeen 256 cm $^2$ solar panels consisting of silicon (Si) solar cells. The solar cells are K6700 Si cells connected in series in 4 strings of 8 cells each. The EPS also consists of electrical components needed to generate, regulate, and provide ± 15 V and +5 V power for the various power control electronics. In eclipse, two Nickel-Cadmium batteries of ten cells each maintain the bus voltage at 12 Vdc. The EPS control interface provides the power switching of all modules on the printed circuit boards (PCBs) in the Digital Control Subsystem (DCS) and COMM. The watchdog timer in the EPS is used to reset the DCS in the event of a failure. The EPS is also dependent on the Ni-Cd batteries for voltage regulation during all modes of operation. An EPS block diagram developed by the SSAG is shown in Figure 2.
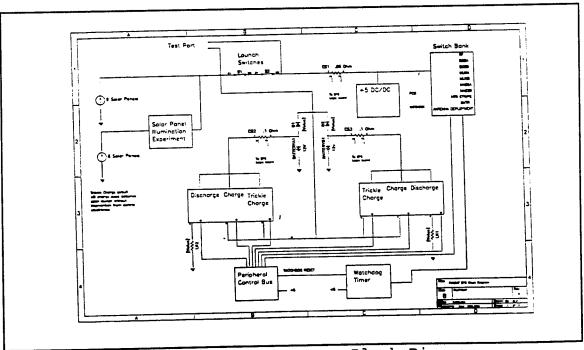
**Figure 2.** Electrical Power System Block Diagram

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Voltage sensors monitor the solar panel bus and battery voltages, and thermal sensors monitor the temperature of the solar panels, batteries and electronics housings. Figure 3 shows the solar panels and box placement. The triangular panels of the satellite do not have solar panels and could be used for passive thermal control if required. The EPS is mounted underneath the upper equipment plate, and above the DCS and batteries, which are mounted on the top of the lower equipment plate.
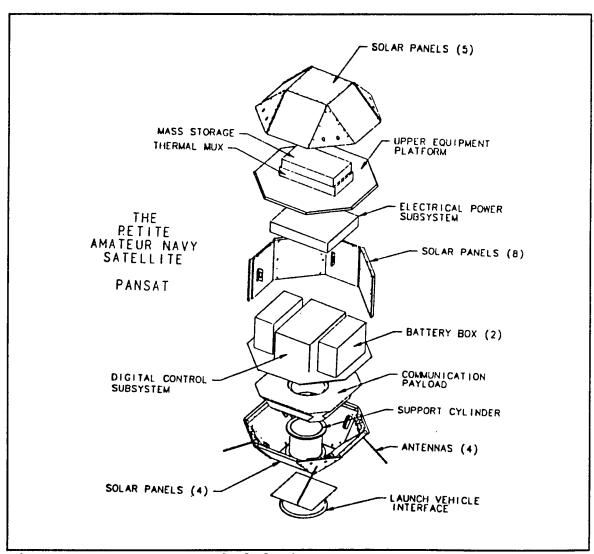
**Figure 3.** PANSAT Exploded View

PANSAT Design requirements include:

- 21.5 Watts at 15.2 Vdc average minimum electrical power at end of life (EOL)

- Minimum of 60 percent power conversion efficiency

- 12 Volt regulated bus

- Nickel-Cadmium batteries with a 10 percent Depth of Discharge (DOD)

- Mission life of 24 months [FRD, 1993]

Terrestrial Ni-Cd batteries are the chosen type due to high energy density, cycle life and reliability. Space rated batteries will not be used because of their prohibitively high cost. Figure 4 shows the proposed F-cell,
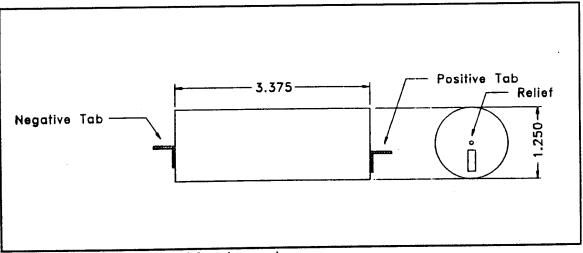


**Figure 4.** Ni-Cd Cell Dimensions

its 32 psi pressure relief valve and the cell dimensions. Although the F-cell has a pressure relief valve it is still considered a closed cell. The batteries will be fully discussed in Chapter VI.

# III. STEADY STATE THERMAL ANALYSIS

## A. BACKGROUND

A nodal analysis based on a finite difference model of PANSAT structure was performed in 1992 using the Intercept Thermal Analyzer Software Package. Input into the analyzer program is written by a model builder program which can be saved for modification for later use. THANSS is the model builder and the thermal analyzer is TASS. TASS provides the solution of Equation 3.1 using the Cholesky reduction in an iterative scheme

$$[A] \times [T] = [B] \qquad\qquad 3.1$$

to solve for T (the node temperature vector). THANSS uses conductance paths to generate node to node conductances to form a set of heat balance equations (Equations 3.2, 3.4, and 3.13) where A is the matrix of conductances and B is a column vector of constant temperatures and heat inputs. The node temperatures obtained after each iteration are used to update the temperature dependent terms in the A matrix. This process continues until the change in the nodal temperatures between successive iterations is smaller than 0.05. When the iterative solution is obtained, the temperatures are then written into an output file. [Kraus, 1990]

This analysis resulted in a steady state temperature map of the PANSAT structure (including the square panels where the solar panels are mounted, the triangular panels, and both equipment plates). To accurately model the structure, the square panels were divided into nine equal nodes, the triangular panels were divided into six nodes, and the equipment plates eight nodes each. The model connects the nodes together through a network of user defined conduction paths and connects individual nodes

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through constant temperature sinks through conduction and radiation. Results of the steady state analysis for sunlight and shadow zones both with internal heat dissipation are shown in Appendix A.

Conductance values are either calculated or input by the analyst from separate calculations. There are ten different modes that can be selected to characterize node-to-node heat flow. Three of these methods were used for analysis of the Electrical Power System: heat flow between nodes for conduction (method designator 1), heat flow between nodes for radiation (method designator 3), and a constant heat input (method designator 10). The heat balance equation for conduction is

$$q = K_1 \ (T_2 - T_1) \qquad\qquad 3.2$$

with the conductance, $K_1$ determined from the Fourier Law and $[A] = [K]$

$$K_1 = k \ \frac{A}{\Delta L} \qquad\qquad 3.3$$

where q is the heat flow, $T_1$ and $T_2$ define the node-to-node temperature difference for the path, k is the thermal conductivity of the material in Btu / ft - hr - °F or W/m° C, A is the cross sectional area for heat flow and L is the length of the heat flow path. The units of the conductance are Btu/hr ° F or W / ° C.

The heat flow equation by radiation is governed by the Stefan-Boltzmann Law shown in Equation 3.4.

$$q = \sigma \ F_A \ F_\epsilon \ A (T_2^4 - T_1^4) \qquad\qquad 3.4$$

or

$$q = k_3 (T_2 - T_1) \qquad\qquad 3.5$$

where

$$K_3 = \sigma\, F_A\, F_\epsilon\, A (T_2 + T_1) (T_2^2 + T_1^2) \qquad\qquad 3.6$$

Equation 3.6 derives from the fact that $T_2^4$ - $T_1^4$ can be written as the sum and difference of squares

$$(T_2^4 - T_1^4) = (T_2^2 + T_1^2)(T_2^2 - T_1^2) = (T_2^2 + T_1^2)(T_2 + T_1)(T_2 - T_1) \qquad 3.7$$

Here $\sigma$ is the Stefan-Boltzmann constant ($1.713 \times 10^{-9}$ Btu/ft$^2$-R$^4$ or $5.669 \times 10^{-8}$W/m$^2$-K$^4$), $F_A$ is the arrangement or shape factor and $F_E$ is the emissivity factor. For radiation between two non-black surfaces, (where a blackbody is a perfect absorber and emitter of radiation), the emissivity and absorptivity of the surfaces will not be equal to 1. The departure from ideal surfaces for two infinite plates in full view of one another is

$$F_E = \frac{1}{\dfrac{1}{\epsilon_1} + \dfrac{1}{\epsilon_2} - 1} \qquad\qquad 3.8$$

where $\epsilon_1$ is the emissivity of the first plate and $\epsilon_2$ is the emissivity of the second plate. [Class notes AA 3804, July 1993] This closely approximates the configuration of the two printed circuit boards (PCBs) in the EPS. The shape factor $(F_A)$ accounts for the situation where the alignment of the surfaces prevents the interception of all of the emissions from the source. Other terms used to describe the shape factor include view, configuration and arrangement factor.

For radiation, TASS handles the heat flow by developing $K_3$ to permit the use of a linear temperature difference ( Equation 3.9)

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$$q_r = K(T_2 - T_1) \qquad\qquad 3.9$$

by computing $K_3$ from

$$K_3 = \frac{\sigma\ A\ F_A\ F_E (T_2^4 - T_1^4)}{T_2 - T_1}$$

$$= \frac{\sigma\ A\ F_A\ F_E (T_2^2 + T_1^2)\ (T_2^2 - T_1^2)}{T_2 - T_1}$$

$$= \frac{\sigma\ A\ F_A\ F_E (T_2^2 + T_1^2)\ (T_2 + T_1)\ (T_2 - T_1)}{T_2 - T_1} \qquad\qquad 3.10$$

so that $K_3$ is indeed

$$K = \sigma\ A\ F_A\ F_E (T_2^2 + T_1^2)\ (T_2 + T_1) \qquad\qquad 3.6$$

Because heat transfer by radiation is governed by

$$q = \sigma\ F_A\ F_E\ A(T_2^4 - T_1^4) \qquad\qquad 3.4$$

the conductance value is entered by the user so that

$$q = K(T_2 - T_1) \qquad\qquad 3.11$$

The user needs only to enter the value
and TASS handles the computation in accordance with Equation 3.6.

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$$K = \sigma \, F_A \, F_E \, A \qquad\qquad 3.12$$

When a node is to have a constant temperature input, a tag of 10 is entered and the connecting node is specified as 999. Thus the third method of heat flow is in the form

$$q = K_q \qquad\qquad 3.13$$

where $K_q$ is a constant.

## B. BOUNDARY CONDITIONS FOR EPS ANALYSIS

The steady state structural analysis of PANSAT was conducted in 1992 with the transient analysis of the structure completed in January 1994. The segmented panels (or nodes) were taken individually to determine the number of connections (also known as branches) to other nodes. The type of connection (i.e., the mode of heat transfer for conduction, radiation and constant temperature) is specified as the tag number for the particular branch. Tag is used to avoid confusion between node and mode. Constant temperatures are given node numbers, beginning with 301. A total of 983 conductances from 232 nodes determined the total PANSAT thermal model. When the thermal analysis was run, the first file was a summary of the final temperatures of all the nodes, and was followed by the node temperatures after each iteration.

Models were run for steady state conditions in sunlight and shadow with and without internal heat dissipation. The runs with heat dissipations were used because the satellite low power mode is not much less than the high power mode. Appendix A shows that for the steady state analysis for sunlight with internal heat dissipation the temperatures range from 45.3 °C to 60.2 °C. The steady state analysis in the shadow zone (Appendix B) with

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internal heat dissipation resulted in a temperature range of -70.6 °C to 66.6°C.

A transient analysis for the satellite was performed a year later using the same nodes. Average temperatures for the upper equipment plate for the first fourteen orbits are plotted in Figure 5, and for the lower equipment plate in Figure 6. Starting temperature was assumed to be 25 ° C for Kennedy Space Center temperatures in October. Table 2 and Table 3 show the data breakout by node numbers for the upper equipment plate (nodes 211 to 218) and the lower equipment plate (node numbers 219 to 226). The average temperatures for the equipment plates were used as boundary conditions for the transient analysis of the Electrical Power System and the steady state and transient battery analysis.
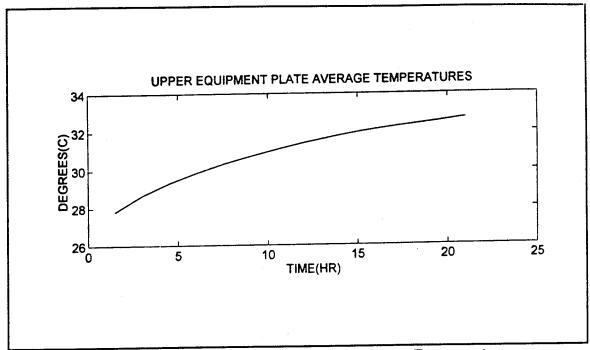
**Figure 5.** Upper Equipment Plate Average Temperatures
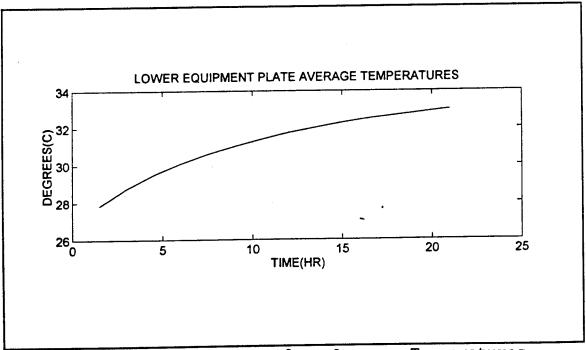


**Figure 6.** Lower Equipment Plate Average Temperatures

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| PASS | 211 | 212 | 213 | 214 | 215 | 216 | 217 | 218 |
|---|---|---|---|---|---|---|---|---|
| 1 | 28.8 | 29.3 | 29.3 | 28.3 | 27.2 | 26.9 | 26.5 | 26.3 |
| 2 | 29.8 | 30.4 | 30.4 | 29.3 | 28.1 | 27.8 | 27.3 | 27.1 |
| 3 | 30.5 | 31.1 | 31.1 | 23.0 | 28.7 | 28.4 | 28.0 | 27.6 |
| 4 | 31.0 | 31.7 | 31.7 | 30.5 | 29.3 | 28.9 | 28.5 | 28.2 |
| 5 | 31.5 | 32.2 | 32.1 | 31.0 | 29.8 | 29.4 | 29.0 | 28.7 |
| 6 | 31.9 | 32.6 | 32.6 | 31.4 | 30.2 | 29.9 | 29.4 | 29.1 |
| 7 | 32.3 | 33.0 | 32.9 | 31.8 | 30.6 | 30.2 | 29.8 | 29.5 |
| 8 | 32.6 | 33.3 | 33.3 | 32.2 | 30.9 | 30.6 | 30.1 | 29.8 |
| 9 | 32.9 | 33.6 | 33.6 | 32.5 | 31.2 | 30.9 | 30.4 | 30.1 |
| 10 | 33.2 | 33.9 | 33.9 | 32.7 | 31.5 | 31.1 | 30.7 | 30.4 |
| 11 | 33.4 | 34.1 | 34.1 | 33.0 | 31.7 | 31.4 | 30.9 | 30.6 |
| 12 | 33.6 | 34.3 | 34.3 | 33.2 | 31.9 | 31.6 | 31.1 | 30.8 |
| 13 | 33.8 | 34.5 | 34.5 | 33.3 | 32.1 | 31.7 | 31.3 | 31.0 |
| 14 | 34.0 | 34.7 | 34.6 | 33.5 | 32.2 | 31.9 | 31.5 | 31.2 |

Table 2.   Upper Equipment Plate Temperatures in Degrees C by Node

| PASS | 219 | 220 | 221 | 222 | 223 | 224 | 225 | 226 |
|------|------|------|------|------|------|------|------|------|
| 1 | 28.2 | 28.8 | 28.9 | 28.2 | 27.7 | 27.8 | 27.8 | 27.9 |
| 2 | 29.2 | 29.9 | 29.9 | 29.3 | 28.8 | 23.0 | 29.0 | 28.9 |
| 3 | 30.0 | 30.7 | 30.7 | 30.1 | 29.6 | 29.8 | 29.7 | 29.7 |
| 4 | 30.6 | 31.3 | 31.4 | 30.7 | 30.3 | 30.4 | 30.4 | 30.3 |
| 5 | 31.5 | 31.3 | 31.4 | 30.7 | 30.3 | 30.4 | 30.4 | 30.3 |
| 6 | 31.6 | 32.3 | 32.4 | 31.7 | 31.3 | 31.4 | 31.4 | 31.3 |
| 7 | 32.0 | 32.7 | 32.7 | 32.1 | 31.7 | 31.8 | 31.8 | 31.7 |
| 8 | 32.4 | 33.1 | 33.1 | 32.4 | 32.0 | 32.2 | 32.1 | 32.1 |
| 9 | 32.7 | 33.4 | 33.4 | 32.7 | 32.3 | 32.5 | 32.4 | 32.4 |
| 10 | 32.9 | 33.6 | 33.7 | 33.0 | 32.6 | 32.7 | 32.7 | 32.6 |
| 11 | 33.2 | 33.9 | 33.9 | 33.2 | 32.8 | 33.0 | 32.9 | 32.9 |
| 12 | 33.4 | 34.1 | 34.1 | 33.4 | 33.1 | 33.2 | 33.1 | 33.1 |
| 13 | 33.5 | 34.2 | 34.3 | 33.6 | 33.2 | 33.3 | 33.3 | 33.2 |
| 14 | 33.7 | 34.4 | 34.4 | 33.8 | 33.3 | 33.5 | 33.4 | 33.4 |

Table 3.   Lower Equipment Plate Temperatures in Degrees C by Node

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# IV. STEADY STATE ANALYSIS OF THE EPS USING THANSS

## A. PROCEDURE THEORY

A thermal resistance may be defined as the reciprocal of the conductance.

$$R = \frac{1}{K} \qquad\qquad 4.1$$

R is the resistance in ° F-hr/ Btu or ° C/W. This relationship does not apply exclusively to the conduction mode of heat transfer . If the analogy exists between the heat flow and the direct current statement of Ohm's Law

$$q = K \, \Delta T = \frac{\Delta T}{R} \qquad\qquad 4.2$$

then it is analogous to

$$I = \frac{\Delta V}{R_E} \qquad\qquad 4.3$$

where $R_E$ is the electrical resistance and all of the d-c network thorems apply. The addition of thermal resistances in series and the combination of resistances in parallel are permitted operations. For example, the combination of two resistors in series is given by

$$R_C = R_A + R_B \qquad\qquad 4.4$$

and in parallel where $R_C$ is the equivalent resistance.

$$R_C = \frac{R_A \, R_B}{R_A + R_B} \qquad\qquad 4.5$$

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## B. DESCRIPTION OF NODES

To simplify calculations and to assure accuracy in the node descriptions, the printed circuit boards were divided into 72 nodes with each node having an area of 1 square inch. This size results in relatively easy calculations when using areas and lengths between nodes and between printed circuit boards. The top board nodes were numbered 1-72 with the bottom board nodes numbered 73-144. Appendix C shows the node numbering, which will be used for reference later in this chapter.

The boards have six layers, alternating copper and epoxy. It was assumed for the analysis that copper covered 25% of the top layer. This takes circuit board components into consideration. This layer is designated by $R_1$. The other two copper layers were assumed to have 100% coverage and are designated by $R_4$. The epoxy layers are homogeneous. Figure 7 describes the Node 1 to Node 2 upper board conductances. Appendix 3 shows the node numbers and their relationshps for reference. $R_2$ describes the conductance of the polyimide (epoxy) layers in each node. To calculate the resistances of $R_1$ through $R_4$ Equation 4.6 is used.

$$R = \frac{12 \ L_i}{k_i \ w_i \ (th_i)} \qquad 4.6$$

where L is the lenght of the heat flow path, th is the thickness of the contact area, w is the width, and k is the thermal conductivity of the material. Each epoxy layer is 0.01933 inches thick: each copper layer is 0.00134 inches thick. Table 4 lists the resistances calculated by equation 4.6 for the network shown in Figure 7. $R_A$ through $R_E$ are the equivalent resistances as the network is calculated, beginning with resistance $R_A$ and working to resistance $R_E$. A sample calculation is included for resistance A.

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$$R_i = \frac{12L_i}{k_i w_i (th)_i}$$
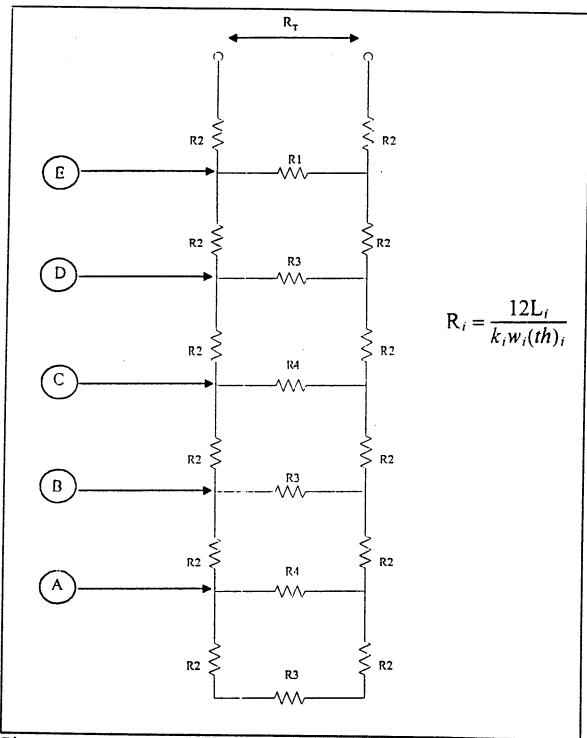
Figure 7. Electrical Power System Node 1 to Node 2

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| $R_i^{\#}$ | $L_i$ | $w_i$ | $th_i$ | $k_i$ | $R_i$ |
|---|---|---|---|---|---|
| 1 | 1.00 | 1.00 | 0.00134 | 385 (.25) | 93.04129 |
| 2 | .01933/2 | 1.00 | 1.00 | 0.15 | 0.77320 |
| 3 | 1.00 | 1.00 | 0.01933 | 0.15 | 4138.645 |
| 4 | 1.00 | 1.00 | 0.00134 | 385 | 23.26032 |

Table 4.   Node 1 to Node 2 Resistances

$$R_A = \frac{(R_3 + R_2 + R_2)\ R_4}{R_3 + R_4 + 2\ R_2} \qquad 4.7$$

As a result, for Node 1 to Node 2

$$R_A = 23.13037$$
$$R_B = 24.53051$$
$$R_C = 12.79438$$
$$R_D = 13.79438$$
$$R_E = R_T = 13.16939$$

Using Equation 4.1, K = 0.075934 °F-hr / Btu.

The node 1 to node 9 calculations are based on the same relationships, so that conductance is  0.075934  °F- hr / Btu.

For the radiation from board to board

$$K = 0.1732\ F_A\ F_E\ A \qquad 4.8$$

$F_A$ = 1.00 because the boards are parallel to each other.

$$F_E = \frac{1}{\dfrac{1}{\epsilon_1} + \dfrac{1}{\epsilon_2} - 1} \qquad 3.8$$

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Because the emissivity of both boards is assumed to be 0.8, $F_\varepsilon = 0.6667$.
After converting the node area into square feet

$$K = 0.1732 \ (1.0) \ (\frac{2}{3}) \ (\frac{1}{144}) = 0.801852 \ x \ 10^{-3} \qquad 4.9$$

Figure 8 describes the contact of the board layers to the housing rails.
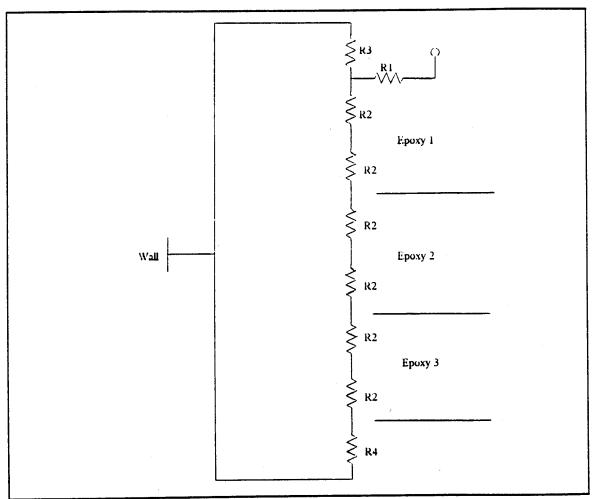


**Figure 8.** PCB Layers To Housing Conductances

Resistance $R_1$ is copper and resistance $R_2$ is epoxy. Resistances $R_3$ and $R_4$ are contacts with the railings.

$R_1$ is half that of the previous $R_1$ ( the path length has been halved).

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$$R_2 = \frac{(12)(0.01933/2)}{(1)(0.2)(0.15)} \qquad 4.10$$

$h_c = 500$ for copper contact

$h_c = 400$ for epoxy contact

$$R_4 = \frac{1}{400(0.2)(1/144)} = 1.88 \qquad 4.11$$

$$R_3 = \frac{1}{500\ (0.2)\ (1/144)} = 1.44 \qquad 4.12$$

Figure 9 is a simplification of Figure 8.
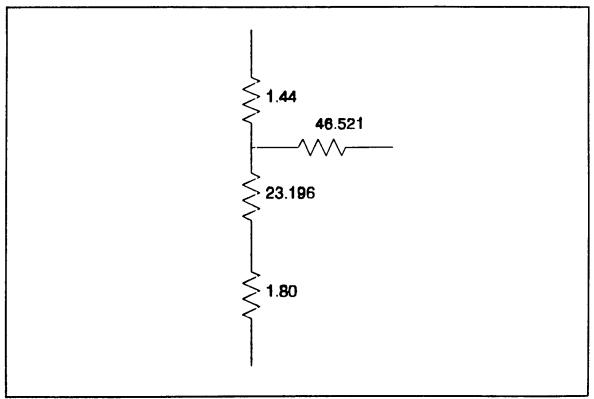


**Figure 9.** Equivalent Conductance of Figure 8

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The equivalent resistance from the network shown in Figure 9 ($R_T$) = 47.88. $K_T$ is the equivalent conductance, or 0.020885 ° F-hr/ Btu.

Once the conductances were calculated an input file was created, listing the conductances for each node with its associated mode. The input file is shown in Appendix D. The conductance values are listed by node. Beginning at lines 7 and 8 in Appendix D, the node equation describes what node is connected to what, by how much, and by which tag. At line seven, the fixed point integer values are connections and tags. Table 5 describes Node 1 connections contained in line 7.

| NODE CONNECTION | POSITION | HOW | TAG |
|---|---|---|---|
| 2 | TOP PCB | CONDUCTION | 1 |
| 9 | TOP PCB | CONDUCTION | 1 |
| 73 | BOTTOM PCB | RADIATION | 3 |
| 301 | CONSTANT TEMPERATURE | CONDUCTION | 1 |
| 303 | CONSTANT TEMPERATURE | RADIATION | 3 |

Table 5. Node Connections To Node 1

Line 8 contains floating point real numbers which are the appropriate conductance values for the connection. Each node requires an even number of lines. The three constant temperatures defined for the railings and housing were all 33.5 °C. Appendix E lists the heat dissipation by node in watts. The conductances need only be input in one direction as THANSS calculates the reverse connection automatically.

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Table 6 lists the results of the steady state analysis of the circuit boards. The highest temperatures appeared on the bottom boards where the heat dissipations were the highest. However, the amount of dissipated heat is relatively low. Temperatures ranged from 34.42 °C to 36.31 °C on the upper board to 34.77 ° to 38.02 °C on the lower board, well within standard operating temperatures for electronic piece parts. A run at 25 °C constant heat source temperatures compared very favorably with an earlier steady state analysis performed using the Integrated Thermal Analysis System (ITAS).

PRINTED CIRCUIT BOARDS - S. PATTERSON - RUN A
Temperatures, degC

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 35.38 | 2 | 35.78 | 3 | 35.96 | 4 | 35.92 | 5 | 35.80 | 6 | 35.67 |
| 7 | 35.48 | 8 | 35.19 | 9 | 35.62 | 10 | 36.14 | 11 | 36.31 | 12 | 36.12 |
| 13 | 35.88 | 14 | 35.72 | 15 | 35.54 | 16 | 35.34 | 17 | 35.56 | 18 | 36.00 |
| 19 | 36.15 | 20 | 36.10 | 21 | 35.91 | 22 | 35.71 | 23 | 35.48 | 24 | 35.18 |
| 25 | 35.65 | 26 | 36.16 | 27 | 36.24 | 28 | 36.25 | 29 | 35.95 | 30 | 35.64 |
| 31 | 35.36 | 32 | 35.00 | 33 | 35.48 | 34 | 35.91 | 35 | 36.05 | 36 | 36.05 |
| 37 | 36.07 | 38 | 35.56 | 39 | 35.24 | 40 | 34.90 | 41 | 35.55 | 42 | 35.96 |
| 43 | 35.80 | 44 | 35.69 | 45 | 35.58 | 46 | 35.32 | 47 | 35.10 | 48 | 34.86 |
| 49 | 35.36 | 50 | 35.60 | 51 | 35.65 | 52 | 35.42 | 53 | 35.27 | 54 | 35.08 |
| 55 | 34.87 | 56 | 34.63 | 57 | 35.01 | 58 | 35.34 | 59 | 35.28 | 60 | 35.17 |
| 61 | 35.06 | 62 | 34.91 | 63 | 34.72 | 64 | 34.49 | 65 | 34.80 | 66 | 35.03 |
| 67 | 35.08 | 68 | 35.04 | 69 | 34.95 | 70 | 34.81 | 71 | 34.64 | 72 | 34.42 |
| 73 | 35.53 | 74 | 36.12 | 75 | 36.49 | 76 | 36.67 | 77 | 36.91 | 78 | 37.19 |
| 79 | 37.02 | 80 | 36.25 | 81 | 35.66 | 82 | 36.56 | 83 | 36.93 | 84 | 36.90 |
| 85 | 37.20 | 86 | 38.02 | 87 | 37.99 | 88 | 36.51 | 89 | 35.63 | 90 | 36.28 |
| 91 | 36.75 | 92 | 37.10 | 93 | 37.32 | 94 | 37.94 | 95 | 37.80 | 96 | 36.43 |
| 97 | 35.63 | 98 | 36.23 | 99 | 36.82 | 100 | 37.78 | 101 | 37.44 | 102 | 37.35 |
| 103 | 37.06 | 104 | 36.08 | 105 | 35.46 | 106 | 36.01 | 107 | 36.63 | 108 | 37.69 |
| 109 | 37.25 | 110 | 36.91 | 111 | 36.50 | 112 | 35.74 | 113 | 35.43 | 114 | 35.90 |
| 115 | 36.26 | 116 | 36.54 | 117 | 36.55 | 118 | 36.43 | 119 | 36.15 | 120 | 35.46 |
| 121 | 35.11 | 122 | 35.60 | 123 | 35.75 | 124 | 35.91 | 125 | 36.05 | 126 | 36.03 |
| 127 | 35.83 | 128 | 35.23 | 129 | 34.85 | 130 | 35.18 | 131 | 35.38 | 132 | 35.53 |
| 133 | 35.68 | 134 | 35.70 | 135 | 35.55 | 136 | 35.02 | 137 | 34.71 | 138 | 34.99 |
| 139 | 35.19 | 140 | 35.32 | 141 | 35.41 | 142 | 35.38 | 143 | 35.21 | 144 | 34.86 |
| 301 | 33.50 | 302 | 33.50 | 303 | 33.50 | | | | | | |

Figure 10.    PANSAT PCB Temperature by Node

# V. TRANSIENT ANALYSIS OF EPS USING ITAS

## A. GEOMETRY GENERATION

To begin the analysis of the electrical power system, the geometry of the EPS was reproduced in the computer using the Integrated Thermal Analysis System ( ITAS). The geometry was generated by piecing together, rotating and translating shapes from a geometry generation menu. These shapes were then stored in a PARTS file, which were then selectively plotted to allow for surface number and node number displays. The EPS was divided into three distinctly separate entities: the housing and the upper and lower circuit boards. Figure 10 and Figure 11 show the surface numbers and corresponding node numbers for the EPS housing. Each surface generated by ITAS is accessible for thermal node definitions and optical
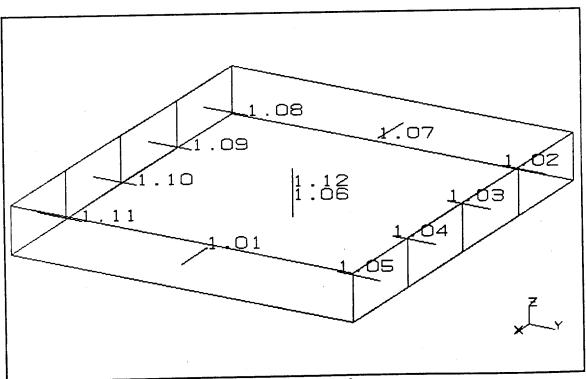


**Figure 10.** EPS Housing Surface Nodes
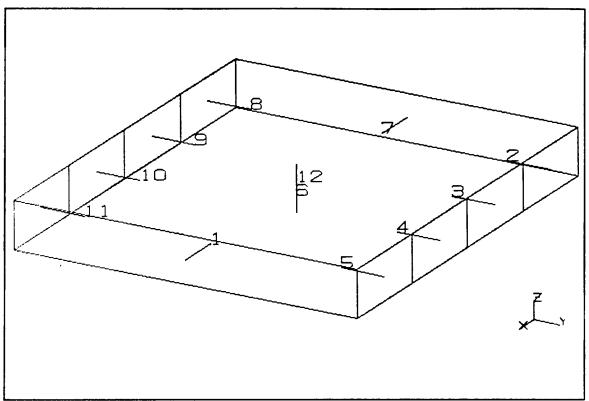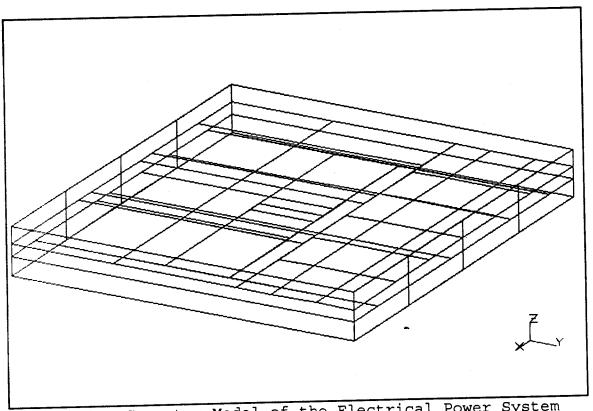
**Figure 11.** EPS Housing Node Numbers

properties definition. The housing is modelled as a six-sided box having 12 physical nodes. The dimensions of the housing are 9 inches in the X direction, 8 inches in the Y direction, and 1.569 inches in the Z direction. It is mounted underneath the upper equipment plate as seen in Figure 2 and Figure 3.

The upper printed circuit board is modelled as two four sided polygons. The polygons have node numbers from 2.01 to 2.18 and 3.01 to 3.12. This division of the upper equipment panel was done to accurately represent heat dissipations on the board and to define a workable number of conductance values. Appendix F shows both the surface numbers and node numbers for the upper PCB.

The lower PCB was constructed from 5 separate polygons: these node numbers ranged from 4.00 to 8.00. Appendix G shows the surface numbers and corresponding node numbers for the lower PCB. Figure 12 is a view of the integrated thermal nodes of both PCBs and the housing.



**Figure 12.** Geometry Model of the Electrical Power System

## B.   THERMAL PARAMETERS

### 1.   Radiation Conductance Parameters (Script-F)

Script-F factors are the energy quantities incident on each of the surfaces of an enclosure after multiple reflections from the surrounding surfaces. (ITAS User's Manual). The Script Fs are in the IR wavelength and are used during the thermal analysis to account for all thermal radiation interchange, and are calculated from the blackbody view factors in

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conjunction with surface optical properties. Since the EPS is an enclosure with no view to space, the program is set to ignore the space node inclusion in the Script F calculations since surfaces inside the enclosures do not "see" surfaces outside the enclosure. [ITAS User's Manual, 1992]

### 2. Optical Properties Data

The optical properties data defines the properties of all surfaces and combines the geometric surfaces that have been created into thermal nodes. The optical properties listed in the Material Properties Library of ITAS were used for the housing (Aluminum 6061-T6) and for the copper layers of the printed circuit boards. These properties include the solar absorptivity (alpha) and infrared emissivity (epsilon) values. Individual capacitances and thermal dissipations were not defined in these screens but were defined in the User Node section. The surfaces that are listed in the Optical Properties entries in Appendix H are the geometric surfaces that ITAS generates.

### 3. Non-Geometric Node Definitions

In addition to the Optical Property node generation, additional non-geometric nodes were created. These nodes do not have a physical presence in ITAS. Examples of these nodes included the rails in the EPS housing to which the circuit boards are secured; the PCB board layers, which alternate copper and polyimide; the upper equipment plate, to which the top of the EPS is mounted; and the component pin nodes. Table 6 indicates the non-geometric node assignments. These nodes are also known as diffusion nodes: diffusion nodes, although not part of the ITAS geometry file still have finite mass. Nodes are not numbered consecutively to allow for flexibility and also to allow easy identification. For example, all nodes that are numbered 9XX are either housing or railing nodes: all of these nodes are

made of aluminum.  Nodes 16XX and 6XX, 14XX and 4XX, 12XX and 2XX are all copper layers of the printed circuit boards.

| Node Number | Identification | Node Number | Identification |
|---|---|---|---|
| 901-912 | EPS housing | 913 | Equipment Plate |
| 921-926 | EPS rails | 201-230 | Top PCB top Cu |
| 401-430 | Top PCB mid Cu | 601-630 | Top PCB bot Cu |
| 1201-1217 | Bot PCB top Cu | 1401-1417 | Bot PCB mid Cu |
| 1601-1617 | Bot PCB bot Cu | 101-130 | Top PCB T poly |
| 301-330 | Top PCB M poly | 501-530 | Top PCB B poly |
| 1101-1117 | Bot PCB T poly | 1301-1317 | Bot PCB M poly |
| 1501-1517 | Bot PCB B poly | 2XXX | Pins-Top PCB |
| 3XXX | Pins- Bot PCB | | |

Table 6.    Non-Geometric Node Numbers

The thermal capacitance of the diffusion nodes is entered in this screen.  Thermal mass is also another name for thermal capacitance.

$$Thermal\ Mass = C = c\ \rho\ V \qquad\qquad 5.1$$

where c is specific heat in cal/g °C,

$\rho$ = density of the material in kg/m$^3$,

V = volume of the material in m$^3$.

ITAS requires C to be in W-min / °C. To convert to the correct units the following conversion factor is used.

$$C = (\frac{cal}{g\ ^{\circ}C})\ (\frac{kg}{m^3})\ (m^3) = \frac{cal}{(.001)^{\circ}C} \qquad 5.2$$

$$1\ cal = 1.163\ x\ 10^{-6}\ kw\text{-}hr = 1163\ x\ 10^{-6}\ W\text{-}hr \qquad 5.3$$

$$1163\ x\ 10^{-6}\ W\text{-}hr = 6.978\ x\ 10^{-2}\ W\text{-}min \qquad 5.4$$

$$\frac{6.978\ x\ 10^{-2}\ W\text{-}min}{(0.001)\ ^{\circ}C} = 69.78\ W\text{-}min/^{\circ}C \qquad 5.5$$

This is the conversion factor used in Appendix I to calculate the thermal masses of all physical nodes. The following values were used in the calculations. [Penton Publishers, 1986]

| | |
|---|---|
| EPS Housing Thickness | 0.2 in |
| Equipment Plate Thickness | 0.125 in |
| PCB Board Copper Layer | 0.000134 in |
| PCB Board Poly Layer | 0.001933 |
| Density of Aluminum | 2728 kg/m³ |
| Density of Polyimide | 1950 kg/m³ |
| Density of Pin Material | 8378 kg/m³ |
| Density of Copper | 8666 kg/m³ |
| Specific Heat of Al | 0.199 cal/kg °C |
| Specific Heat of Cu | 0.098 cal/kg °C |
| Specific heat of Ni-Steel | 0.11 cal/kg ° C |
| Specific Heat of Polyimide | 0.31 cal/kg °C |

Since ITAS allows total capacitance of each surface of the nodes to be entered into the model if the remaining surfaces are zeroed out. For pin

conductances, the total thermal mass of the pins in each major node were considered as one node. For example, Node 2011 is the total capacitance of all pins through the top layer of geometric node 3.01.

Heat dissipations were also entered in this screen. These dissipations were obtained from the PANSAT design team. The component list and PCB board layouts are included as Appendix J. The top board design is currently much more mature than the lower board design and estimated heat dissipations were more accurate. Appendix K is the Node Data Entry for Thermal Analysis for the EPS.

### 4. Conductance Definitions

All conductances entered into the EPS model were defined as linear (two way); this type of conductance also applies to the nodes defined by ITAS. All conductance values were precalculated and entered into the model: unlike THANSS, radiation modes are calculated by ITAS. Equation 3.3 was used to calculated all conductances not involving contact conductances.

$$K = \frac{k\,A}{L} \qquad\qquad 3.3$$

Conductances not involving contact conductances included EPS housing to housing nodes; EPS housing to railing nodes (since the rails will be part of the housing); copper board nodes to copper board nodes and polyimide to polyimide nodes: and pin segment nodes to pin segments. Pins were modeled as one equivalent pin through each geometric node; however, each pin was divided into six nodes since they traverse through the board layers.

## 5. Contact Conductances

Contact conductance is defined in Equation 5.6.

$$h_c = \frac{(1.25)\,(k_s)\,\left(\frac{P}{H}\right)^{.95}}{S_r} \qquad\qquad 5.6$$

$$k_s = \frac{2\,k_1\,k_2}{k_1 + k_2} \qquad\qquad 5.7$$

where    P = contact pressure of the surfaces, chosen as 15 psi for all contact.

H = hardness of the material. Brinell hardness numbers were used.

$S_r$ = surface roughness

To calculate total conductance, first the conductance of the first material is calculated using Equation 3.3, resulting in $K_1$. Then the conductance of the second material is calculated, resulting in $K_2$. The total conductance $(K_T)$ is calculated by Equation 5.8, with the results in W /° C.

$$K_T = \frac{1}{\frac{1}{K_1} + \frac{1}{h_c} + \frac{1}{K_2}} \qquad\qquad 5.8$$

The ITAS node-to-node conductance calculations are shown in Appendix L, with the conductance data entry in Appendix M.

## 6. Temperature Profile

ITAS uses temperature profiles for time varying boundary nodes. Boundary nodes without time variation must be input into the user-node definition section. A temperature profile (Figure 13) of the upper equipment

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plate obtained from the THANSS/TASS transient analysis of the spacecraft structure used in the EPS analysis. The initial temperature was an estimate of Kennedy Space Center temperatures in October.
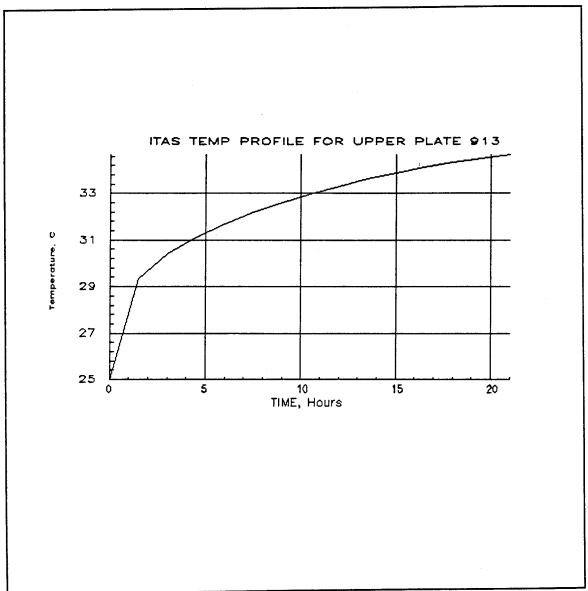


Figure 13. ITAS Temperature Profile For Equipment Plate

# VI. THERMAL ANALYSIS OF BATTERIES

## A. NICKEL-CADMIUM BATTERIES

Batteries can either be primary or secondary; secondary batteries can be recharged and reused. Batteries are made of cells that can be linked together in series or parallel. Cells linked in series have the positive terminal linked to the next cell's negative terminal: in a parallel connection positive terminals are linked to positive terminals and negative to negative. PANSAT's two batteries have 10 cells each linked in series. In series connections the voltage of the connected cells add while the capacity (normally measured in ampere hours) remains constant.

Sealed nickel cadmium cells operate as a closed system that recycle gases created within the cell, so that no electrolye is lost. Sealed cells with a resealable vent for safety are still considered sealed cells. Nickel-cadmium cells (Ni-Cd) have a higher energy to volume ratio than most other secondary batteries, have a relatively high rate of discharge, and can recharge quickly. Ni-Cd batteries are known for their long storage and operating life, can operate over a wide range of temperatures and environments maintenance free. Additionally, Ni-Cd batteries can handle continuous overcharge so the battery can be maintained in a ready state until needed. [Gates Energy Products, 1992]

Temperature is a very important condition for Ni-Cd batteries. The effective internal resistance of these cells is at a minimum when cell temperature is between 20 °C and 40 °C. Figure 14 shows the relationship between cell discharge temperature and the effective internal resistance. Temperature also effects a cell's effective no-load voltage. For an Ni-Cd

cell, the effective no-load voltage is near the peak at room temperature: the decline is more pronounced at cooler temperatures. Figure 15 shows the
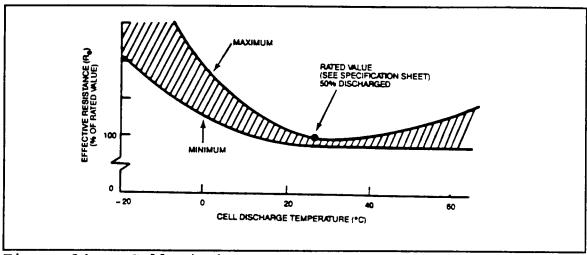


**Figure 14.** Cell Discharge Temp vs Internal Resistance "From Ref. [Gates, 1992]".
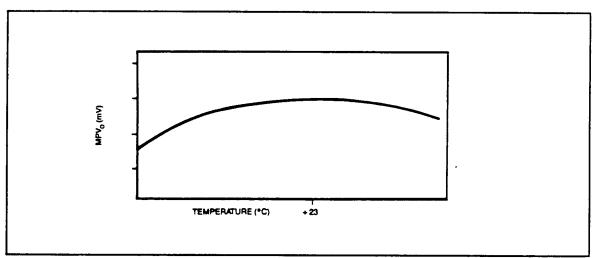


**Figure 15.** Cell Discharge Temperature vs No-Load Voltage "From Ref. [Gates, 1992]".

relationship between cell discharge temperature and no-load voltage.

An increase in cell temperature also has a negative effect on cell capacity. At elevated temperatures more charge is required for the cell to

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become fully charged, and the higher temperatures also decrease the cell capacity to below standard. Cell capacity while charging is not normally affected by temperatures below 23 °C, however, lower temperatures (below 23 °C) have a negative effect on cell capacity during discharge. Room temperature is the ideal environment for PANSAT's batteries. Space rated Ni-Cd batteries would be the technical choice for PANSAT; however, the cost of space rated batteries (approximately $200,000) is prohibitive.

PANSAT batteries are redundant: only one battery will operate at a time. However, the batteries must recharge to full capacity between each use for optimum performance. The current power budget is being examined to determine how long each battery will take to recharge after each use. A typical Ni-Cd battery will require about 160% of energy stored to recharge.

## B. BATTERY GEOMETRY MODEL

To model the PANSAT battery, it was necessary to include the Digital Control Subsystem and the Electrical Power Subsystem in the model due to the proximity in the spacecraft. The model was built using ITAS. The two batteries and the DCS were the mounted on the lower equipment plate, built by connecting seven polygons. The spacecraft structure was built around the lower equipment plate, and the upper equipment plate, with the Electrical Power Subsystem (EPS) attached was added. The build progression is demonstrated in Appendix N. The geometric battery thermal model is shown in Figure 16.

After building the geometry model each surface was assigned a surface number and a node number. An example of this assignment is shown in Appendix O. The surface number and node number are related in the property data information of the model, shown in Appendix P. This is where the absorptivities and emissivities of the structure and box housings
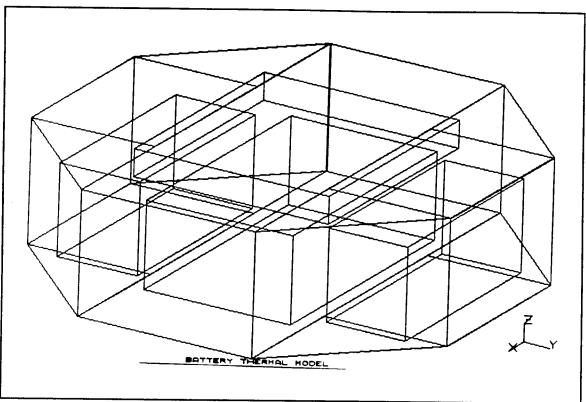
**Figure 16.** Battery Thermal Model

are listed. Since the box housing designs are not finalized, Aluminum- 6061-T6 was chosen. This material has an absorptivity of 0.4 and an emissivity of 0.79. Additionally, every surface on the boxes is given its own surface number and node number.

## C. BOUNDARY CONDITIONS

Since a large percent of the model required the incorporation of PANSAT's structure, boundary nodes were used to define temperatures on areas that had already been analyzed. Surfaces that were defined as boundary nodes have temperatures which remain constant. The results from the transient analysis of PANSAT's structure were used. The structure was divided into areas as seen in Figure 17. Each square area is divided into nine

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equal nodes: the triangular areas are divided into six unequal nodes. The sections affecting the battery model are sections one through eight.



**AVERAGE TEMPERATURE**

**SHADOW**

**DEGREES CENTIGRADE**
**ORBIT 14**

**SUNLIGHT**

| | | | |
|---|---|---|---|
| U1 | U3 | U5 | U7 |
| U2 | U4 | U6 | U8 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| 30.62 | 32.68 | 33.21 | 29.00 | 30.87 | 33.40 | 33.42 | 28.66 |
| 33.44 | 39.87 | 38.83 | 31.14 | 30.79 | 33.26 | 33.26 | 28.56 |

| D1 | D2 | D3 | D4 | D5 | D6 | D7 | D8 |
|---|---|---|---|---|---|---|---|

T

B

**PANSAT THERMAL**

**ANALYSIS**
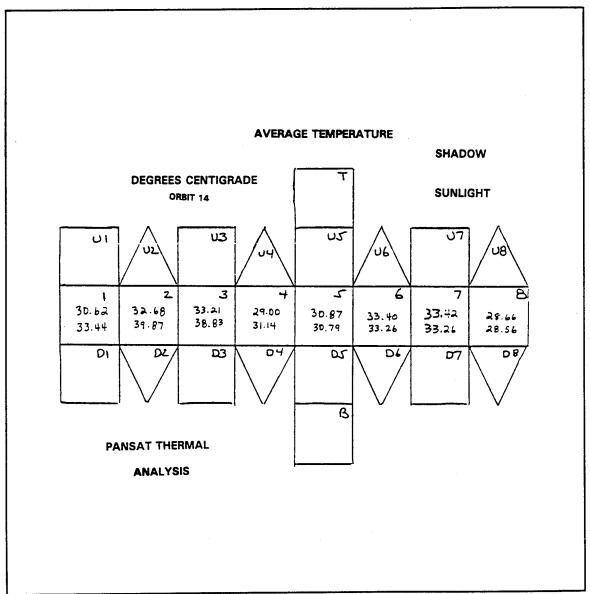
Figure 17.    PANSAT Structural Divisions

Appendix Q lists the transient temperatures with internal heat dissipation by node for the shadow and sunlit zones for orbit 14. This was chosen since the spacecraft temperatures are leveling out: however, worst case

temperatures were not extrapolated.  Table 7 relates the structural number of Figure 17 to the node numbers of Appendix Q, and then lists the average temperature for that area for both shadow and sunlight.

|  | NODE | AVG. TEMP | AVG. TEMP |  |
|---|---|---|---|---|
| SECTION | NUMBERS | SHADOW | SUNLIGHT | S/C AREA |
| 1 | 1-9 | 30.6 | 33.4 | WALL |
| 2 | 10-18 | 32.7 | 39.9 | WALL |
| 3 | 19-27 | 33.2 | 38.8 | WALL |
| 4 | 28-36 | 29.0 | 31.1 | WALL |
| 5 | 37-45 | 30.9 | 30.8 | WALL |
| 6 | 46-54 | 33.4 | 33.3 | WALL |
| 7 | 55-63 | 33.4 | 33.3 | WALL |
| 8 | 64-72 | 28.7 | 28.6 | WALL |
| N/A | 219-226 | 32.9 | 33.7 | LOWER PL |
| N/A | 211-218 | 32.1 | 32.9 | UPPER PL |

Table 7.    Average Temperatures in Celcius for Pass 14

These temperatures were used as boundary nodes, indicated as negative numbers in Appendix R.  This appendix also lists the thermal masses (capacitances) for all hardware nodes.  The explanation for thermal mass calculation is contained in Chapter V; the thermal mass calculations are included as Appendix S.  Heat inputs to each box were estimated and defined in Appendix R as a node with no mass.  This heat input was attached to the six walls of the housing where that heat input resides, and

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the heat was conducted outward through the walls.  EPS boundary conditions were derived from the transient analysis.

Conductance values were calculated as in Chapter V and included in the ITAS Conductor Data Entry.  Only surfaces within the boxes themselves or conductances between the heat nodes and the boxes are included since the upper plate, lower plate, and sidewalls are defined to have constant temperatures.

# VII. RESULTS AND RECOMMENDATIONS

## A. ELECTRICAL POWER SYSTEM

The analysis of the EPS transient analysis can be divided into three areas;  the housing nodes, the upper board nodes, and the lower board nodes.

### 1.    EPS Housing Nodes

Figures 18 and 19 show the temperature versus time plots for the EPS housing sidewalls and the top and bottom of the housing.  As it would be be expected for a node which touches the outside edges of the housing, the
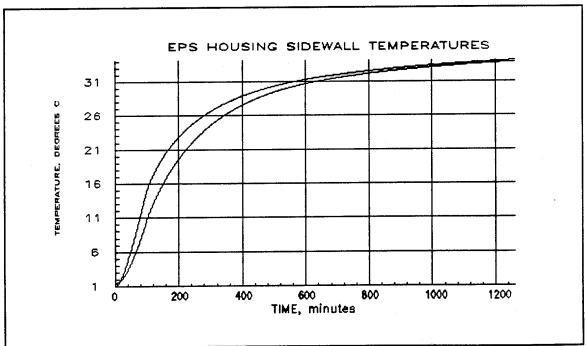


**Figure 18.**    EPS Housing Temperature Trends

temperatures start low and become warmer.  The bottom plate in the EPS housing would tend to be warmer than the top because the bottom has

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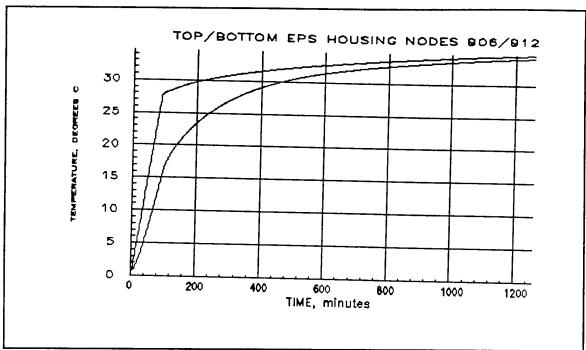
**Figure 19.** EPS Housing Trends

more heat dissipation. One drawback to the present analysis is that there was only enough information for a temperature profile of the lower equipment plate for 14 orbits. This, in effect, results in a transient analysis for that period of time and a steady state analysis for the following time.

### 2. Printed Circuit Boards

From Figure 20 it is apparent that any node that is attached to the housing sidewalls is going to experience a trend similar to the housing itself. In the case of the top PCB, nodes which butt up to the housing start cold and see a decreasing slope, starting to level off after about 17 hours. Nodes that do not touch the sidewalls (midboard in this case) remain between 20°C to 25 °C for the duration. This board remains cooler than the bottom PCB because the heat dissipations in the upper board are relatively low.

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**TOP PCB TEMPERATURES**
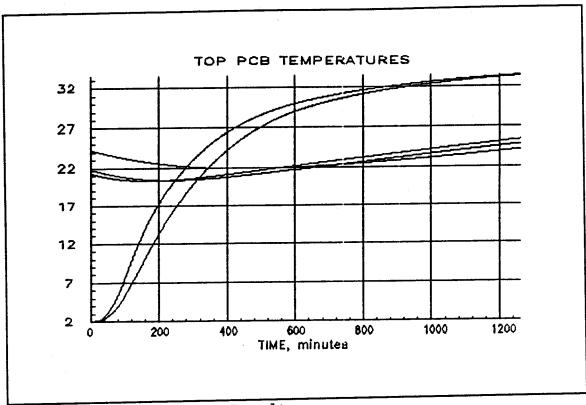
**Figure 20.**   Upper PCB Results

The bottom PCB, as shown in Figure 21, has a similar curve for those nodes which attach to the rails, with the resulting final temperature very similar to the upper PCB.  However, midboard nodes are approximately 4-5 degrees warmer on the bottom board, where the highest heat dissipations are concentrated.

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**BOTTOM PCB THERMAL LAYER**
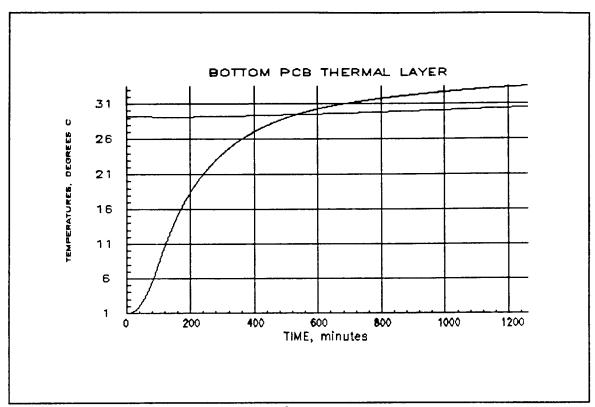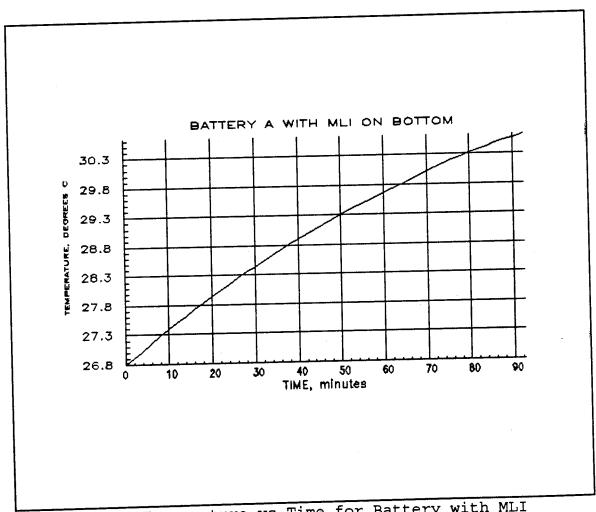
Figure 21. Bottom PCB Trends

## B. BATTERIES

A steady state analysis was performed first on the battery. A copy of the results of both the steady state and the transient analysis is included as Appendix V. The transient analysis shows Battery A, Battery B, and the DCS at 33.7 ° C.

ITAS would not allow the model to be run as an enclosure. An ideal case would have been to run the battery first as an enclosure similar to the procedure used for the EPS. Since the cell information was not available, this run was performed to give a general battery environmental range. The analysis was effectively a steady state analysis since most of the structure had boundary nodes attached. This temperature is within the advertised

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advertised operating ranges for a battery but is some distance from the ideal 23 °C. A second analysis was performed simulating a layer of Multilayer Insulation (MLI) on the bottom of both batteries. The result of this analysis can be seen from Figure 22. Although the initial temperatures are lower, the boxes quickly heat up. A third run insulating all six sides reduced the temperature by 3 °C to 30.7 °C.



**Figure 22.**  Temperature vs Time for Battery with MLI

## C. RECOMMENDATIONS

To make the thermal analysis more realistic for the Electrical Power System, duty cycles for the printed circuit boards need to be established. This would give a more accurate time versus temperature plot. For the batteries, cell selection would allow the modelling of the cells inside the batteries as demonstrated in Appendix W. Dissipations for the high power use boxes would contribute to the accuracy of the model. As the individual boxes are created by ITAS, the spacecraft subsystems can be combined into a viable and accurate spacecraft model.

This analysis is only as accurate as the boundary conditions. This model should be rerun when boundary conditions obtained from the transient analysis of PANSAT structure using ITAS are completed.

ITAS was created to model spinning and stationary spacecraft. When PANSAT design is mature enough to run the entire model, there is an option in the Parameter Set Up and Alteration Menu for user defined spacecraft attitudes, where the satellite can be rotated in time on the X-Y-Z axes to more accurately represent a tumbling body.

ITAS can accurately represent the orbit of the satellite, and allows two methods. The first method requires the definition of the inclination, sun Right Ascension and Declination, and the Longitude of the Ascending Node. The other method requires definition of the beta angles. Both methods define perigee and apogee, so that time spent in sunlight and time spent in shadow are considered in the satellite's environment. The most likely orbit, looking ahead with shuttle mission manifests, suggests planning for a 51.6° inclination and a 213 NM circular orbit.
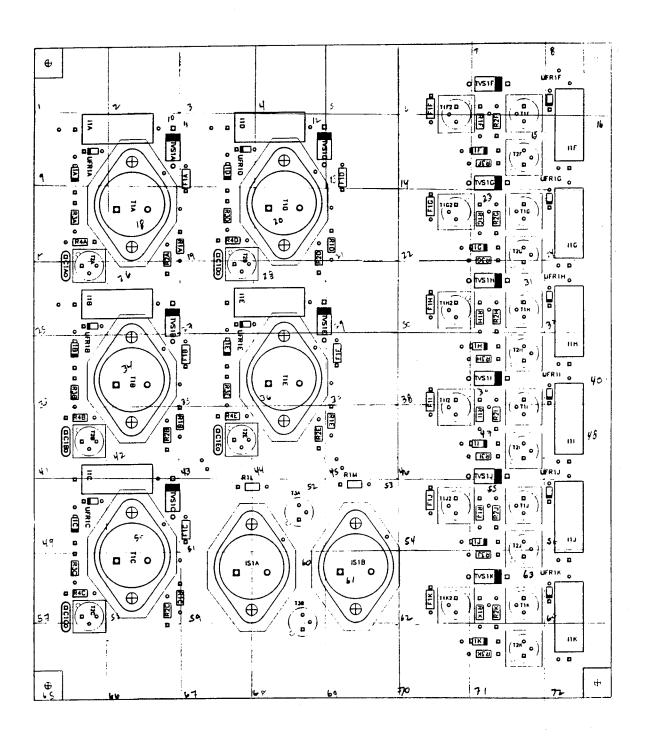
# APPENDIX A. PANSAT STEADY STATE TEMPS IN SUNLIGHT
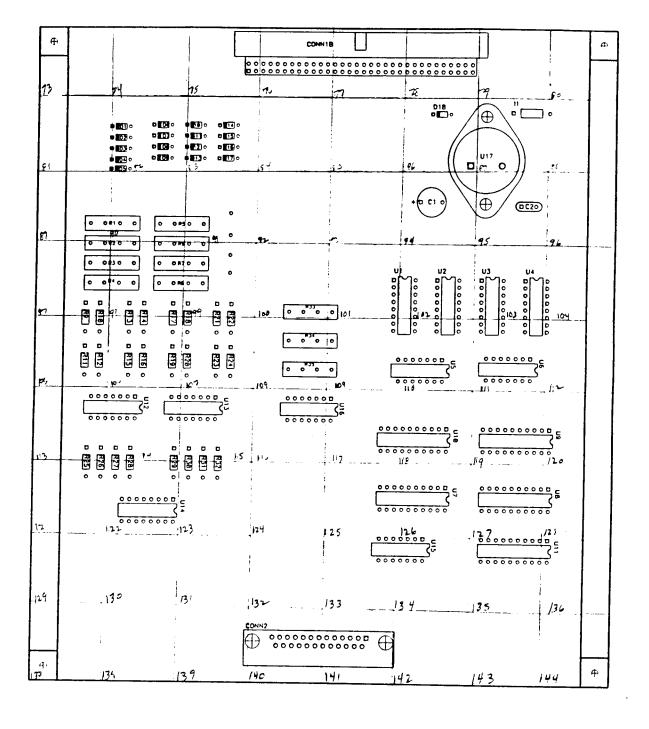
PANSAT - STEADY STATE - SUNLIGHT ZONE - WITH INTERNAL HEAT DISSIPATION

Temperatures, degC

| | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 54.98 | 2 | 57.32 | 3 | 59.02 | 4 | 53.88 | 5 | 56.55 | 6 | 58.84 |
| 7 | 53.63 | 8 | 55.55 | 9 | 57.55 | 10 | 64.39 | 11 | 65.71 | 12 | 65.90 |
| 13 | 64.44 | 14 | 66.16 | 15 | 66.49 | 16 | 61.06 | 17 | 62.18 | 18 | 62.52 |
| 19 | 64.12 | 20 | 63.05 | 21 | 61.13 | 22 | 65.46 | 23 | 64.24 | 24 | 61.74 |
| 25 | 62.28 | 26 | 61.51 | 27 | 59.63 | 28 | 55.48 | 29 | 53.59 | 30 | 52.79 |
| 31 | 54.99 | 32 | 52.71 | 33 | 51.62 | 34 | 53.55 | 35 | 52.01 | 36 | 51.35 |
| 37 | 51.82 | 38 | 51.59 | 39 | 51.60 | 40 | 50.76 | 41 | 50.59 | 42 | 50.82 |
| 43 | 51.37 | 44 | 51.37 | 45 | 51.53 | 46 | 51.62 | 47 | 51.80 | 48 | 52.02 |
| 49 | 52.04 | 50 | 52.41 | 51 | 52.65 | 52 | 52.10 | 53 | 52.33 | 54 | 52.55 |
| 55 | 52.52 | 56 | 52.34 | 57 | 51.47 | 58 | 52.86 | 59 | 52.60 | 60 | 51.47 |
| 61 | 53.11 | 62 | 52.98 | 63 | 52.18 | 64 | 48.10 | 65 | 47.91 | 66 | 49.27 |
| 67 | 47.95 | 68 | 47.46 | 69 | 48.96 | 70 | 48.85 | 71 | 48.42 | 72 | 49.51 |
| 73 | 49.42 | 74 | 52.32 | 75 | 58.48 | 76 | 51.94 | 77 | 56.38 | 78 | 59.60 |
| 79 | 53.83 | 80 | 57.12 | 81 | 59.59 | 82 | 64.99 | 83 | 64.86 | 84 | 63.83 |
| 85 | 65.70 | 86 | 65.11 | 87 | 66.18 | 88 | 62.35 | 89 | 59.82 | 90 | 57.10 |
| 91 | 64.39 | 92 | 62.35 | 93 | 59.92 | 94 | 63.36 | 95 | 61.71 | 96 | 59.46 |
| 97 | 52.58 | 98 | 51.86 | 99 | 52.36 | 100 | 51.26 | 101 | 53.86 | 102 | 52.37 |
| 103 | 48.07 | 104 | 44.92 | 105 | 44.12 | 106 | 48.10 | 107 | 46.00 | 108 | 45.74 |
| 109 | 50.27 | 110 | 49.21 | 111 | 48.95 | 112 | 45.59 | 113 | 45.67 | 114 | 47.48 |
| 115 | 47.75 | 116 | 49.05 | 117 | 49.52 | 118 | 44.90 | 119 | 44.92 | 120 | 45.32 |
| 121 | 46.75 | 122 | 46.39 | 123 | 46.29 | 124 | 49.21 | 125 | 48.94 | 126 | 48.41 |
| 127 | 45.90 | 128 | 46.22 | 129 | 44.97 | 130 | 45.43 | 131 | 46.38 | 132 | 47.89 |
| 133 | 49.96 | 134 | 51.51 | 135 | 53.56 | 136 | 47.60 | 137 | 49.41 | 138 | 53.08 |
| 139 | 46.96 | 140 | 48.34 | 141 | 53.13 | 142 | 57.85 | 143 | 58.21 | 144 | 58.69 |
| 145 | 58.77 | 146 | 62.04 | 147 | 62.32 | 148 | 57.53 | 149 | 56.13 | 150 | 54.21 |
| 151 | 57.53 | 152 | 54.98 | 153 | 52.82 | 154 | 56.64 | 155 | 53.07 | 156 | 51.50 |
| 157 | 50.39 | 158 | 49.35 | 159 | 49.92 | 160 | 49.00 | 161 | 50.82 | 162 | 50.60 |
| 163 | 50.26 | 164 | 50.41 | 165 | 50.65 | 166 | 48.66 | 167 | 48.35 | 168 | 49.35 |
| 169 | 48.97 | 170 | 47.28 | 171 | 49.22 | 172 | 50.37 | 173 | 50.63 | 174 | 50.98 |
| 175 | 51.27 | 176 | 54.24 | 177 | 54.37 | 178 | 51.72 | 179 | 51.14 | 180 | 50.49 |
| 181 | 50.83 | 182 | 49.86 | 183 | 48.86 | 184 | 50.46 | 185 | 48.74 | 186 | 48.11 |
| 187 | 47.21 | 188 | 47.06 | 189 | 47.15 | 190 | 46.91 | 191 | 48.63 | 192 | 48.54 |
| 193 | 44.30 | 194 | 46.16 | 195 | 50.51 | 196 | 44.97 | 197 | 47.58 | 198 | 52.66 |
| 199 | 46.52 | 200 | 49.44 | 201 | 54.75 | 202 | 47.11 | 203 | 46.56 | 204 | 47.86 |
| 205 | 46.43 | 206 | 45.95 | 207 | 48.40 | 208 | 45.99 | 209 | 46.81 | 210 | 50.18 |
| 211 | 58.00 | 212 | 58.41 | 213 | 58.30 | 214 | 56.97 | 215 | 54.40 | 216 | 53.37 |
| 217 | 52.53 | 218 | 52.18 | 219 | 54.88 | 220 | 56.02 | 221 | 56.09 | 222 | 54.86 |
| 223 | 53.86 | 224 | 53.78 | 225 | 53.69 | 226 | 54.02 | 227 | 53.85 | 228 | 53.26 |
| 229 | 51.16 | 230 | 50.79 | 231 | 48.47 | 232 | 47.90 | | | | |
| 301 | -272.80 | | | | | | | | | | |

# APPENDIX B.   PANSAT STEADY STATE TEMPS IN SHADOW

PANSAT - STEADY STATE - SHADOW ZONE - WITH INTERNAL HEAT DISSIPATION
Temperatures, degC

```
  1   -19.14    2   -19.99    3   -20.56    4   -18.34    5   -19.32    6   -19.99
  7   -16.10    8   -17.14    9   -17.65   10   -21.82   11   -21.92   12   -21.63
 13   -20.83   14   -20.72   15   -19.87   16   -18.65   17   -18.29   18   -15.44
 19   -20.86   20   -20.75   21   -20.73   22   -20.03   23   -20.14   24   -20.19
 25   -17.47   26   -17.81   27   -17.93   28   -20.84   29   -20.63   30   -19.70
 31   -20.23   32   -19.81   33   -18.54   34   -18.17   35   -17.85   36   -16.89
 37   -15.75   38   -14.72   39   -13.46   40   -14.94   41   -13.27   42   -11.58
 43   -13.84   44   -12.45   45   -11.21   46   -10.08   47    -9.24   48    -8.99
 49    -7.89   50    -6.78   51    -6.50   52    -8.06   53    -7.29   54    -7.12
 55    -9.28   56    -9.74   57   -10.81   58    -6.96   59    -7.61   60    -9.01
 61    -7.67   62    -8.18   63    -9.19   64   -14.46   65   -15.52   66   -16.85
 67   -13.05   68   -14.63   69   -15.68   70   -12.57   71   -13.70   72   -14.61
 73   -22.36   74   -24.09   75   -25.30   76   -22.12   77   -23.14   78   -24.54
 79   -20.75   80   -21.69   81   -22.36   82   -25.89   83   -25.88   84   -24.88
 85   -24.87   86   -23.35   87   -23.37   88   -25.80   89   -25.26   90   -24.27
 91   -24.93   92   -24.34   93   -22.48   94   -22.66   95   -22.31   96   -21.87
 97   -23.37   98   -23.22   99   -22.69  100   -22.34  101   -22.11  102   -21.47
103   -22.51  104   -20.87  105   -18.13  106   -21.13  107   -19.28  108   -16.09
109   -19.15  110   -17.80  111   -15.57  112   -15.17  113   -15.02  114   -12.88
115   -12.24  116   -11.56  117   -10.70  118   -15.61  119   -17.25  120   -18.41
121   -13.71  122   -14.89  123   -15.65  124   -12.85  125   -13.81  126   -14.76
127   -19.81  128   -20.18  129   -18.39  130   -18.92  131   -16.96  132   -18.62
133   -15.03  134   -15.38  135   -17.14  136   -15.21  137   -17.17  138   -18.68
139   -14.50  140   -17.04  141   -18.87  142   -18.88  143   -18.47  144   -19.43
145   -19.44  146   -19.59  147   -19.64  148   -17.73  149   -17.47  150   -17.44
151   -19.37  152   -19.00  153   -18.53  154   -19.44  155   -18.79  156   -18.08
157   -18.05  158   -17.21  159   -18.05  160   -17.13  161   -17.16  162   -16.83
163   -13.53  164   -11.66  165   -10.02  166   -13.95  167   -11.47  168    -8.60
169   -14.16  170   -11.15  171    -7.36  172    -8.40  173    -7.93  174    -7.32
175    -6.85  176    -2.19  177    -2.04  178    -8.09  179    -9.45  180    -9.89
181    -6.35  182    -7.57  183    -9.09  184    -5.65  185    -7.91  186    -9.34
187   -12.97  188   -14.11  189   -12.09  190   -13.32  191   -11.10  192   -11.38
193   -20.05  194   -22.76  195   -24.46  196   -21.20  197   -24.10  198   -25.41
199   -21.99  200   -24.54  201   -25.83  202   -10.78  203   -13.59  204   -15.85
205   -12.25  206   -14.59  207   -16.46  208   -13.09  209   -15.07  210   -17.72
211   -18.92  212   -19.12  213   -19.11  214   -18.23  215   -15.99  216   -14.82
217   -14.09  218   -14.19  219   -13.66  220   -14.04  221   -14.20  222   -13.39
223   -12.32  224   -11.53  225   -11.48  226   -12.52  227   -13.80  228   -12.66
229   -14.06  230   -13.39  231   -14.59  232   -13.79
301  -272.80
```

# APPENDIX C.   EPS NODE DIVISIONS

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# APPENDIX D.   THANSS/TASS INPUT FILE

```
PRINTED CIRCUIT BOARDS - S. PATTERSON - RUN B
    144       3       0       0       0       0       0       0       0       1
      0       0       0
    300      50       6       2       4       6       0       0       0       0
 .500000E-01 .666670                12 .800000      77.0000
 92.3000         92.3000         92.3000
      5      21              91             733            3011            3033
 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
      5      11              31             101             743            3033
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
      5      21              41             111             753            3033
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
      5      31              51             121             763            3033
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
      5      41              61             131             773            3033
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
     .6      51              71             141             783            3033            9991
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .102390E-01
      6      61              81             151             793            3033            9991
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E-02
      6      71             161             803            3011            3033            9991
 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .102390E-01
      7      11             101             171             813            3011            3033            9
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .682600E
      7      21              91             111             181             823            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .139933
      7      31             101             121             191             833            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .139933
      7      41             111             131             201             843            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .546080E
      7      51             121             141             211             853            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
      7      61             131             151             221             863            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
      7      71             141             161             231             873            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .170650E
      7      81             151             241             883            3011            3033            9
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .000000             .801852E-03 .204780E
      7      91             181             251             893            3011            3033            9
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .170650E
      7     101             171             191             261             903            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .204780E
      7     111             181             201             271             913            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
      7     121             191             211             281             923            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
      7     131             201             221             291             933            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
      7     141             211             231             301             943            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
      7     151             221             241             311             953            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
      7     161             231             321             963            3011            3033            9
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .307170E
      7     171             261             331             973            3011            3033            9
 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .682600E
      7     181             251             271             341             983            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .139933
      7     191             261             281             351             993            3033            9
 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
```

```
   144       3       0       0       0       0       0       0       0       1
     0       0       0
   300      50       6       2       4       6       0       0       0       0
.500000E-01 .666670            12 .800000      77.0000
 92.3000       92.3000       92.3000
     5      21            91           733          3011          3033
.759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
     5      11            31           101           743          3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
     5      21            41           111           753          3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
     5      31            51           121           763          3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
     5      41            61           131           773          3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
     6      51            71           141           783          3033          9991
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .102390E-01
     6      61            81           151           793          3033          9991
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E-02
     6      71           161           803          3011          3033          9991
.759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .102390E-01
     7      11           101           171           813          3011          3033          9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .682600E
     7      21            91           111           181           823          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .139933
     7      31           101           121           191           833          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .139933
     7      41           111           131           201           843          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .546080E
     7      51           121           141           211           853          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
     7      61           131           151           221           863          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
     7      71           141           161           231           873          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .170650E
     7      81           151           241           883          3011          3033          9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .000000      .801852E-03 .204780E
     7      91           181           251           893          3011          3033          9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .170650E
     7     101           171           191           261           903          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .204780E
     7     111           181           201           271           913          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
     7     121           191           211           281           923          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
     7     131           201           221           291           933          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
     7     141           211           231           301           943          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .136520E
     7     151           221           241           311           953          3033          9
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     7     161           231           321           963          3011          3033          9
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     7     171           261           331           973          3011          3033          9
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     7     181           251           271           341           983          3033          9
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     7     191           261           281           351           993          3033          9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
```

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    7     201          271          291          361         1003         3033            9
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    6     211          281          301          371         1013         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    7     221          291          311          381         1023         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .341300E
    7     231          301          321          391         1033         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .102390E
    6     241          311          401         1043         3011         3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
    7     251          341          411         1053         3011         3033            9
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    7     261          331          351          421         1063         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .204780E
    7     271          341          361          431         1073         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .477820E
    7     281          351          371          441         1083         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .273040E
    7     291          361          381          451         1093         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .170650
    6     301          371          391          461         1103         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    7     311          381          401          471         1113         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .102390E
    7     321          391          481         1123         3011         3033            9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .341300E
    7     331          421          491         1133         3011         3033            9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .784990E
    7     341          411          431          501         1143         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .156998
    6     351          421          441          511         1153         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    6     361          431          451          521         1163         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    7     371          441          461          531         1173         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .682600E
    7     381          451          471          541         1183         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .341300E
    7     391          461          481          551         1193         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .170650E
    7     401          471          561         1203         3011         3033            9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .000000     .801852E-03 .341300E
    7     411          501          571         1213         3011         3033            9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .784990E
    7     421          491          511          581         1223         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .341300E
    7     431          501          521          591         1233         3033            9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .853250E
    6     441          511          531          601         1243         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    6     451          521          541          611         1253         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    6     461          531          551          621         1263         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    6     471          541          561          631         1273         3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
    6     481          551          641         1283         3011         3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
    7     491          581          651         1293         3011         3033            9
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03 .102390E
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      501        571        591        661       1303       3033        9
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03 .784990E
  6     511        581        601        671       1313       3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  6     521        591        611        681       1323       3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  6     531        601        621        691       1333       3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  6     541        611        631        701       1343       3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  6     551        621        641        711       1353       3033
.759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  6     561        631        721       1363       3011       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
  5     571        661       1373       3011       3033
.759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
  5     581        651        671       1383       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     591        661        681       1393       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     601        671        691       1403       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     611        681        701       1413       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     621        691        711       1423       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     631        701        721       1433       3033
.759341E-01 .759341E-01 .759341E-01 .801852E-03 .801852E-03
  5     641        711       1443       3011       3033
.759341E-01 .759341E-01 .801852E-03 .208850E-01 .801852E-03
  5     13         741        811       3011       3023
.801852E-03 .759341E-01 .759341E-01 .208850E-01 .801852E-03
  5     23         731        751        821       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     33         741        761        831       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     43         751        771        841       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     53         761        781        851       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     63         771        791        861       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     73         781        801        871       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  5     83         791        881       3011       3023
.801852E-03 .759341E-01 .759341E-01 .208850E-01 .801852E-03
  6     93         731        821        891       3011       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
  7    103         741        811        831        901       3023        9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .204780
  7    113         751        821        841        911       3023        9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .180889
  6    123         761        831        851        921       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  6    133         771        841        861        931       3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
  7    143         781        851        871        941       3023        9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .307170
  7    153         791        861        881        951       3023        9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .426625
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   6    163       801       871       961      3011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
   7    173       811       901       971      3011      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03 .102390E
   7    183       821       891       911       981      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .238910E
   7    193       831       901       921       991      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .170650E
   6    203       841       911       931      1001      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
   6    213       851       921       941      1011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
   7    223       861       931       951      1021      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .238910
   7    233       871       941       961      1031      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .307170
   6    243       881       951      1041      3011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
   7    253       891       981      1051      3011      3022         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03 .238910E
   7    263       901       971       991      1061      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .511950E
   7    273       911       981      1001      1071      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .238910E
   7    283       921       991      1011      1081      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .341300
   7    293       931      1001      1021      1091      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .614340
   7    303       941      1011      1031      1101      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .614340E
   7    313       951      1021      1041      1111      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .122868
   6    323       961      1031      1121      3011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
   6    333       971      1061      1131      3011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
   6    343       981      1051      1071      1141      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
   6    353       991      1061      1081      1151      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
   7    363      1001      1071      1091      1161      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .409560
   7    373      1011      1081      1101      1171      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .102390
   7    383      1021      1091      1111      1181      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .614340E
   7    393      1031      1101      1121      1191      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .614340E
   6    403      1041      1111      1201      3011      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
   7    413      1051      1141      1211      3011      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03 .648470E
   7    423      1061      1131      1151      1221      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E+01 .759341E-01 .801852E-03 .648470E
   7    433      1071      1141      1161      1231      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .648470E
   6    443      1081      1151      1171      1241      3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
   7    453      1091      1161      1181      1251      3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .341300E
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    7    463         1101        1171        1191        1261        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .511950E
    7    473         1111        1181        1201        1271        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .853250E
    6    483         1121        1191        1281        3011        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    6    493         1131        1221        1291        3011        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    7    503         1141        1211        1231        1301        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .853250E
    6    513         1151        1221        1241        1311        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    6    523         1161        1231        1251        1321        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    7    533         1171        1241        1261        1331        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .341300E
    7    543         1181        1251        1271        1341        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .511950E
    7    553         1191        1261        1281        1351        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .853250E
    6    563         1201        1271        1361        3011        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    6    573         1211        1301        1371        3011        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    6    583         1221        1291        1311        1381        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    6    593         1231        1301        1321        1391        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    6    603         1241        1311        1331        1401        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    7    613         1251        1321        1341        1411        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .341300E
    7    623         1261        1331        1351        1421        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .511950E
    7    633         1271        1341        1361        1431        3023         9
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .759341E-01 .801852E-03 .853250E
    6    643         1281        1351        1441        3011        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    5    653         1291        1381        3011        3023
.801852E-03 .759341E-01 .759341E-01 .208850E-01 .801852E-03
    5    663         1301        1371        1391        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    673         1311        1381        1401        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    683         1321        1391        1411        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    693         1331        1401        1421        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    703         1341        1411        1431        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    713         1351        1421        1441        3023
.801852E-03 .759341E-01 .759341E-01 .759341E-01 .801852E-03
    5    723         1361        1431        3011        3023
.801852E-03 .759341E-01 .759341E-01 .208850E-01 .801852E-03
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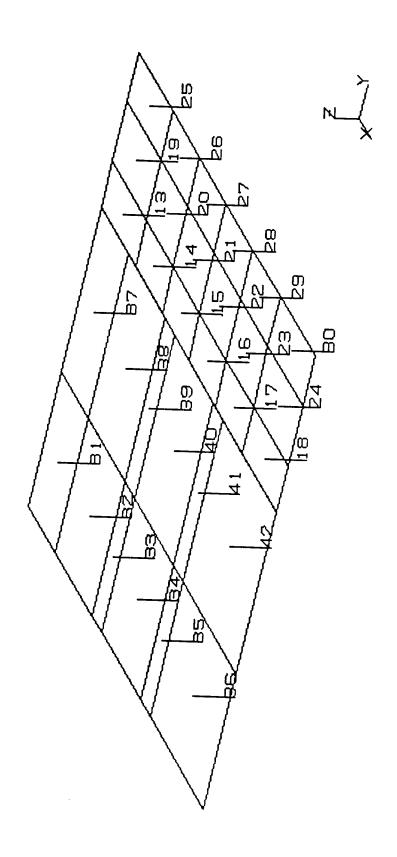
## APPENDIX E.   HEAT DISSIPATIONS BY NODE

| NODE | WATTS | NODE | WATTS | NODE | WATTS | NODE | WATTS |
|------|-------|------|-------|------|-------|------|-------|
| 6 | .003 | 25 | .02 | 49 | .023 | 102 | .018 |
| 7 | .002 | 26 | .041 | 50 | .010 | 103 | .036 |
| 8 | .003 | 27 | .020 | 51 | .025 | 108 | .120 |
| 9 | .020 | 28 | .030 | 57 | .003 | 109 | .030 |
| 10 | .041 | 30 | .001 | 58 | .023 | 110 | .018 |
| 11 | .011 | 31 | .003 | 82 | .060 | 111 | .018 |
| 12 | .016 | 33 | .001 | 83 | .053 | 113 | .019 |
| 13 | .002 | 34 | .006 | 86 | .090 | 114 | .019 |
| 14 | .002 | 35 | .014 | 87 | .125 | 115 | .019 |
| 15 | .005 | 36 | .008 | 89 | .003 | 117 | .010 |
| 16 | .006 | 37 | .050 | 90 | .007 | 118 | .015 |
| 17 | .005 | 39 | .003 | 91 | .005 | 119 | .025 |
| 18 | .006 | 40 | .001 | 94 | .070 | 122 | .025 |
| 19 | .004 | 41 | .023 | 95 | .090 | 125 | .010 |
| 20 | .004 | 42 | .046 | 97 | .007 | 126 | .015 |
| 21 | .002 | 45 | .002 | 98 | .015 | 127 | .025 |
| 22 | .004 | 46 | .001 | 99 | .007 | 133 | .010 |
| 23 | .004 | 47 | .005 | 100 | .100 | 134 | .015 |
| 24 | .009 | 48 | .001 | 101 | .018 | 135 | .025 |
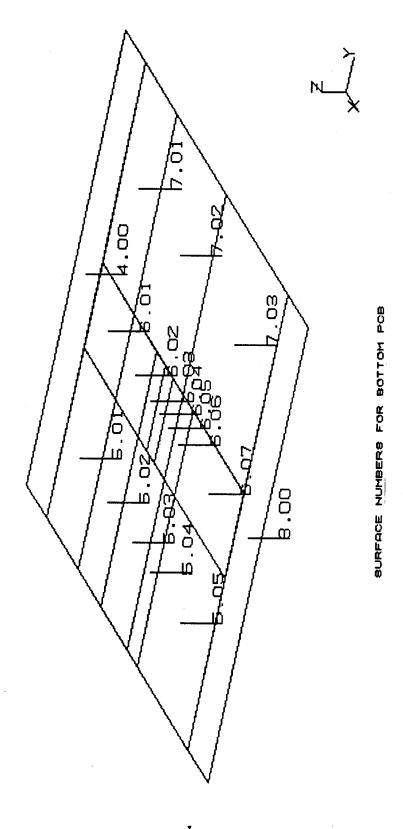
PCB HEAT DISSIPATIONS BY NODE
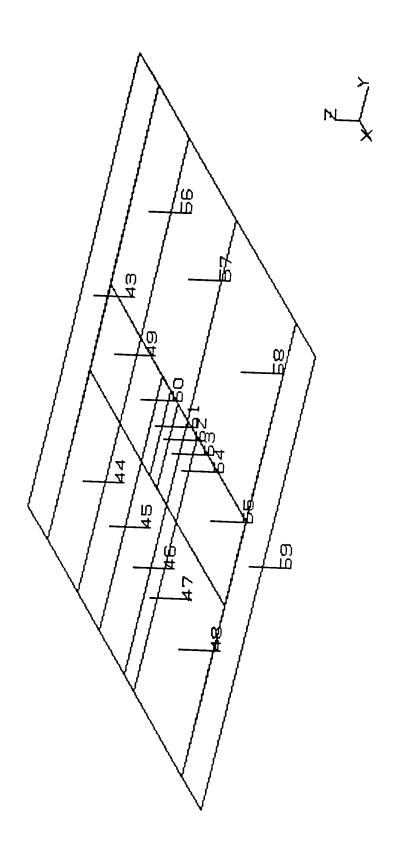
# APPENDIX F.   SURFACE/NODE NUMBERS FOR TOP PCB



SURFACE NUMBERS FOR TOP PCB

# APPENDIX G. SURFACE/NODE NUMBERS FOR BOTTOM PCB



SURFACE NUMBERS FOR BOTTOM PCB

# APPENDIX H.   OPTICAL PROPERTY DATA FOR EPS

èëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëëëëëf

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 1 | 1.01 | 1 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 2 | 1.02 | 2 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 3 | 1.03 | 3 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 4 | 1.04 | 4 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 5 | 1.05 | 5 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 6 | 1.06 | 6 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 7 | 1.07 | 7 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 8 | 1.08 | 8 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 9 | 1.09 | 9 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 10 | 1.10 | 10 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 11 | 1.11 | 11 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 12 | 1.12 | 12 | .4 | .79 | 1. | 0. | | EPS HOUSING |
| 13 | 2.01 | 13 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 14 | 2.02 | 14 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 15 | 2.03 | 15 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 16 | 2.04 | 16 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 17 | 2.05 | 17 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 18 | 2.06 | 18 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |

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èëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëëëëëf

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 19 | 2.07 | 19 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 20 | 2.08 | 20 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 21 | 2.09 | 21 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 22 | 2.10 | 22 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 23 | 2.11 | 23 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 24 | 2.12 | 24 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 25 | 2.13 | 25 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 26 | 2.14 | 26 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 27 | 2.15 | 27 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 28 | 2.16 | 28 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 29 | 2.17 | 29 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 30 | 2.18 | 30 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 31 | 3.01 | 31 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 32 | 3.02 | 32 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 33 | 3.03 | 33 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 34 | 3.04 | 34 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 35 | 3.05 | 35 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 36 | 3.06 | 36 | 0 | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |

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ëëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëf

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 37 | 3.07 | 37 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 38 | 3.08 | 38 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 39 | 3.09 | 39 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 40 | 3.10 | 40 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 41 | 3.11 | 41 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 42 | 3.12 | 42 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 43 | 4.00 | 43 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 44 | 5.01 | 44 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 45 | 5.02 | 45 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 46 | 5.03 | 46 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 47 | 5.04 | 47 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 48 | 5.05 | 48 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 49 | 6.01 | 49 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 50 | 6.02 | 50 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 51 | 6.03 | 51 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 52 | 6.04 | 52 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 53 | 6.05 | 53 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 54 | 6.06 | 54 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |

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S-F1Load/Save All            S-F4Auto TM    UDC Allowed            ESCQuit
    F1Load/Save Page F3PropLib F4AutoGen F5ImportPropFmt F6NewPropFile F10Search

PgDn PgUp Home End                                                      F2Help
ëëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëf

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 42 | 3.12 | 42 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 1 |
| 43 | 4.00 | 43 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 44 | 5.01 | 44 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 45 | 5.02 | 45 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 46 | 5.03 | 46 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 47 | 5.04 | 47 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 48 | 5.05 | 48 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 49 | 6.01 | 49 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 50 | 6.02 | 50 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 51 | 6.03 | 51 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 52 | 6.04 | 52 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 53 | 6.05 | 53 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 54 | 6.06 | 54 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 55 | 6.07 | 55 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 56 | 7.01 | 56 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 57 | 7.02 | 57 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 58 | 7.03 | 58 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |
| 59 | 8.00 | 59 | 0. | .01 | 1. | 0. | | PRINTED CIRCUIT 2 |

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S-F1Load/Save All            S-F4Auto TM    UDC Allowed            ESCQuit
    F1Load/Save Page F3PropLib F4AutoGen F5ImportPropFmt F6NewPropFile F10Search

# APPENDIX I. THERMAL MASS FOR THE EPS

| NODE | X/Y | Y/Z | thickness | ro(Cu/Al/poly) kg/cubic m | specific heat cal/kg c | CONV. FACTOR | IN TO M | VOLUME cubic meters | THERMAL MASS |
|---|---|---|---|---|---|---|---|---|---|
| 901 | 9.4 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 4.8337E-05 | 1.870687 |
| 902 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 903 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 904 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 905 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 906 | 9.4 | 8.4 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 0.000258783 | 10.01515 |
| 907 | 9.4 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 4.8337E-05 | 1.870687 |
| 908 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 909 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 910 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 911 | 2.1 | 1.569 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.07987E-05 | 0.417919 |
| 912 | 9.4 | 8.4 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 0.000258783 | 10.01515 |
| -913 | 9.4 | 8.4 | 0.125 | 2787 | 0.199 | 69.78 | 61024 | 0.00016174 | 6.259469 |
| 921 | 8.4 | 0.25 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 6.88254E-06 | 0.26636 |
| 922 | 8.4 | 0.375 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.03238E-05 | 0.399541 |
| 923 | 8.4 | 0.199 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 5.4785E-06 | 0.212023 |
| 924 | 8.4 | 2.5 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 6.88254E-05 | 2.663604 |
| 925 | 8.4 | 0.375 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 1.03238E-05 | 0.399541 |
| 926 | 8.4 | 0.199 | 0.2 | 2787 | 0.199 | 69.78 | 61024 | 5.4785E-06 | 0.212023 |
| 601 | 1.375 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 7.17085E-08 | 0.00425 |
| 602 | 1.875 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 9.77843E-08 | 0.005795 |
| 603 | 0.5 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.60758E-08 | 0.001545 |
| 604 | 2 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.04303E-07 | 0.006181 |
| 605 | 0.5 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.60758E-08 | 0.001545 |
| 606 | 2.75 | 2.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.43417E-07 | 0.008499 |
| 607 | 1.375 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 8.6805E-08 | 0.005144 |
| 608 | 1.875 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.1837E-07 | 0.007015 |
| 609 | 0.5 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.15654E-08 | 0.001871 |
| 610 | 2 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.26262E-07 | 0.007483 |
| 611 | 0.5 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.15654E-08 | 0.001871 |
| 612 | 2.75 | 2.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.7361E-07 | 0.010288 |
| 613 | 1.75 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.12223E-08 | 0.00185 |

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 614 | 1.375 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.45318E-08 | 0.001454 |
| 615 | 1.375 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.45318E-08 | 0.001454 |
| 616 | 1.375 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.45318E-08 | 0.001454 |
| 617 | 1.375 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.45318E-08 | 0.001454 |
| 618 | 1.75 | 0.8125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.12223E-08 | 0.00185 |
| 619 | 1.75 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 4.08292E-08 | 0.00242 |
| 620 | 1.375 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.20801E-08 | 0.001901 |
| 621 | 1.375 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.20801E-08 | 0.001901 |
| 622 | 1.375 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.20801E-08 | 0.001901 |
| 623 | 1.375 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.20801E-08 | 0.001901 |
| 624 | 1.75 | 1.0625 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 4.08292E-08 | 0.00242 |
| 625 | 1.375 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.64189E-08 | 0.001566 |
| 626 | 1.375 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.64189E-08 | 0.001566 |
| 627 | 1.375 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.64189E-08 | 0.001566 |
| 628 | 1.375 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.64189E-08 | 0.001566 |
| 629 | 1.375 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.64189E-08 | 0.001566 |
| 630 | 1.75 | 0.875 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.36241E-08 | 0.001993 |
| 1601 | 8 | 1 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.75669E-07 | 0.01041 |
| 1602 | 3 | 1.563 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.02964E-07 | 0.006102 |
| 1603 | 3 | 1.125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 7.41102E-08 | 0.004392 |
| 1604 | 3 | 1.3125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 8.64619E-08 | 0.005124 |
| 1605 | 3 | 0.5 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.29379E-08 | 0.001952 |
| 1606 | 3 | 2.5 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.64689E-07 | 0.009976 |
| 1607 | 1.5 | 1.563 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 5.14819E-08 | 0.003051 |
| 1608 | 1.5 | 1.125 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 3.70551E-08 | 0.002196 |
| 1609 | 1.5 | 1.4375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 4.73482E-08 | 0.002806 |
| 1610 | 1.5 | 0.375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.23517E-08 | 0.000732 |
| 1611 | 1.5 | 0.5 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.64689E-08 | 0.000976 |
| 1612 | 1.5 | 0.5 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.64689E-08 | 0.000976 |
| 1613 | 1.5 | 2.5 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 8.23447E-08 | 0.00488 |
| 1614 | 3.5 | 1.563 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.20124E-07 | 0.007119 |
| 1615 | 3.5 | 2.4375 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 1.87334E-07 | 0.011102 |
| 1616 | 3.5 | 3 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 2.30565E-07 | 0.013664 |
| 1617 | 3.5 | 1 | 0.00134 | 8666 | 0.098 | 69.78 | 61024 | 7.6855E-08 | 0.004555 |
| 501 | 1.375 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.03442E-06 | 0.043634 |
| 502 | 1.875 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.41057E-06 | 0.059501 |
| 503 | 0.5 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.76153E-07 | 0.015867 |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| 504 | 2 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.50461E-06 | 0.063468 |
| 505 | 0.5 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.76153E-07 | 0.015867 |
| 506 | 2.75 | 2.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 2.06884E-06 | 0.087268 |
| 507 | 1.375 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.25219E-06 | 0.05282 |
| 508 | 1.875 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.70754E-06 | 0.072027 |
| 509 | 0.5 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.55343E-07 | 0.019207 |
| 510 | 2 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.82137E-06 | 0.076829 |
| 511 | 0.5 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.55343E-07 | 0.019207 |
| 512 | 2.75 | 2.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 2.50439E-06 | 0.10564 |
| 513 | 1.75 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.50394E-07 | 0.018999 |
| 514 | 1.375 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.53881E-07 | 0.014927 |
| 515 | 1.375 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.53881E-07 | 0.014927 |
| 516 | 1.375 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.53881E-07 | 0.014927 |
| 517 | 1.375 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.53881E-07 | 0.014927 |
| 518 | 1.75 | 0.8125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.50394E-07 | 0.018999 |
| 519 | 1.75 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 5.88977E-07 | 0.024844 |
| 520 | 1.375 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.62767E-07 | 0.01952 |
| 521 | 1.375 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.62767E-07 | 0.01952 |
| 522 | 1.375 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.62767E-07 | 0.01952 |
| 523 | 1.375 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.62767E-07 | 0.01952 |
| 524 | 1.75 | 1.0625 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 5.88977E-07 | 0.024844 |
| 525 | 1.375 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.81103E-07 | 0.016076 |
| 526 | 1.375 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.81103E-07 | 0.016076 |
| 527 | 1.375 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.81103E-07 | 0.016076 |
| 528 | 1.375 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.81103E-07 | 0.016076 |
| 529 | 1.375 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 3.81103E-07 | 0.016076 |
| 530 | 1.75 | 0.875 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.8504E-07 | 0.02046 |
| 1501 | 8 | 1 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 2.53408E-06 | 0.106893 |
| 1502 | 3 | 1.563 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.48529E-06 | 0.062653 |
| 1503 | 3 | 1.125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.06907E-06 | 0.045095 |
| 1504 | 3 | 1.3125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.24724E-06 | 0.052611 |
| 1505 | 3 | 0.5 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 4.75141E-07 | 0.020042 |
| 1506 | 3 | 2.5 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 2.3757E-06 | 0.100212 |
| 1507 | 1.5 | 1.563 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 7.42645E-07 | 0.031326 |
| 1508 | 1.5 | 1.125 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 5.34534E-07 | 0.022548 |
| 1509 | 1.5 | 1.4375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 6.83015E-07 | 0.028811 |
| 1510 | 1.5 | 0.375 | 0.01933 | 1950 | 0.31 | 69.78 | 61024 | 1.78178E-07 | 0.007516 |

PIN THERMAL MASSES

| NODE | # OF PINS | pi | RADIUS | HEIGHT | VOLUME | cal/kg C c | kg/cubic m ro | CONV. FACTOR | cubic in to cubic m | THERMAL MASS |
|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | 6 | 3.14159 | 0.0165 | 0.01933 | 9.92E-05 | 0.11 | 8378 | 69.78 | 61024 | 0.000105 |
| 2012 | 6 | 3.14159 | 0.0165 | 0.00134 | 6.88E-06 | 0.11 | 8378 | 69.78 | 61024 | 7.25E-06 |
| 2021 | 23 | 3.14159 | 0.0165 | 0.01933 | 0.00038 | 0.11 | 8378 | 69.78 | 61024 | 0.000401 |
| 2022 | 23 | 3.14159 | 0.0165 | 0.00134 | 2.64E-05 | 0.11 | 8378 | 69.78 | 61024 | 2.78E-05 |
| 2031 | 4 | 3.14159 | 0.0165 | 0.01933 | 6.61E-05 | 0.11 | 8378 | 69.78 | 61024 | 6.97E-05 |
| 2032 | 4 | 3.14159 | 0.0165 | 0.00134 | 4.58E-06 | 0.11 | 8378 | 69.78 | 61024 | 4.83E-06 |
| 2041 | 25 | 3.14159 | 0.0165 | 0.01933 | 0.000413 | 0.11 | 8378 | 69.78 | 61024 | 0.000436 |
| 2042 | 25 | 3.14159 | 0.0165 | 0.00134 | 2.87E-05 | 0.11 | 8378 | 69.78 | 61024 | 3.02E-05 |
| 2051 | 3 | 3.14159 | 0.0165 | 0.01933 | 4.96E-05 | 0.11 | 8378 | 69.78 | 61024 | 5.23E-05 |
| 2052 | 3 | 3.14159 | 0.0165 | 0.00134 | 3.44E-06 | 0.11 | 8378 | 69.78 | 61024 | 3.62E-06 |
| 2121 | 12 | 3.14159 | 0.0165 | 0.01933 | 0.000198 | 0.11 | 8378 | 69.78 | 61024 | 0.000209 |
| 2122 | 12 | 3.14159 | 0.0165 | 0.00134 | 1.38E-05 | 0.11 | 8378 | 69.78 | 61024 | 1.45E-05 |
| 2131 | 8 | 3.14159 | 0.0165 | 0.01933 | 0.000132 | 0.11 | 8378 | 69.78 | 61024 | 0.000139 |
| 2132 | 8 | 3.14159 | 0.0165 | 0.00134 | 9.17E-06 | 0.11 | 8378 | 69.78 | 61024 | 9.66E-06 |
| 2191 | 14 | 3.14159 | 0.0165 | 0.01933 | 0.000231 | 0.11 | 8378 | 69.78 | 61024 | 0.000244 |
| 2192 | 14 | 3.14159 | 0.0165 | 0.00134 | 1.6E-05 | 0.11 | 8378 | 69.78 | 61024 | 1.69E-05 |
| 3011 | 64 | 3.14159 | 0.0165 | 0.01933 | 0.001058 | 0.11 | 8378 | 69.78 | 61024 | 0.00115 |
| 3012 | 64 | 3.14159 | 0.0165 | 0.00134 | 7.34E-05 | 0.11 | 8378 | 69.78 | 61024 | 7.73E-05 |
| 3021 | 34 | 3.14159 | 0.0165 | 0.01933 | 0.000562 | 0.11 | 8378 | 69.78 | 61024 | 0.000592 |
| 3022 | 34 | 3.14159 | 0.0165 | 0.00134 | 3.9E-05 | 0.11 | 8378 | 69.78 | 61024 | 4.11E-05 |
| 3031 | 32 | 3.14159 | 0.0165 | 0.01933 | 0.000529 | 0.11 | 8378 | 69.78 | 61024 | 0.000558 |
| 3032 | 32 | 3.14159 | 0.0165 | 0.00134 | 3.67E-05 | 0.11 | 8378 | 69.78 | 61024 | 3.86E-05 |
| 3051 | 28 | 3.14159 | 0.0165 | 0.01933 | 0.000463 | 0.11 | 8378 | 69.78 | 61024 | 0.000488 |
| 3052 | 28 | 3.14159 | 0.0165 | 0.00134 | 3.21E-05 | 0.11 | 8378 | 69.78 | 61024 | 3.38E-05 |
| 3141 | 10 | 3.14159 | 0.0165 | 0.01933 | 0.000165 | 0.11 | 8378 | 69.78 | 61024 | 0.000174 |
| 3142 | 10 | 3.14159 | 0.0165 | 0.00134 | 1.15E-05 | 0.11 | 8378 | 69.78 | 61024 | 1.21E-05 |
| 3151 | 100 | 3.14159 | 0.0165 | 0.01933 | 0.001653 | 0.11 | 8378 | 69.78 | 61024 | 0.001742 |
| 3152 | 100 | 3.14159 | 0.0165 | 0.00134 | 0.000115 | 0.11 | 8378 | 69.78 | 61024 | 0.000121 |
| 3161 | 114 | 3.14159 | 0.0165 | 0.01933 | 0.001885 | 0.11 | 8378 | 69.78 | 61024 | 0.001986 |
| 3162 | 114 | 3.14159 | 0.0165 | 0.00134 | 0.000131 | 0.11 | 8378 | 69.78 | 61024 | 0.000138 |

| Component | Designator | Subcircuit | Duty cycle | Power Dissipation, Bus = 15V (Sunlit) | Power Dissipation, Bus = 12V (Eclipse) |
|---|---|---|---|---|---|
| Inductor | I1A | DCSA Power Switch | 100 | 0.039 | 0.061 |
| Transient Voltage Suppressor | TVS1A | " | ~0 | | |
| Ultra Fast Recovery Diode | UFR1A | " | ~0 | | |
| 12v Zener Bi-Directional | D1A | " | ~0 | | |
| PMOSFET Gate Bias Resister | R1A | " | 100 | 0.002 | 0.001 |
| PMOSFET Gate Bias Resister | R2A | " | 100 | 0.000 | 0.000 |
| NMOSFET Gate Protection Resister | R3A | " | 100 | 0.003 | 0.003 |
| PMOSFET | T1A | " | 100 | 0.006 | 0.009 |
| NMOSFET | T2A | " | 100 | 0.000 | 0.000 |
| Pico Fuse | F1A | " | 100 | 0.007 | 0.011 |
| | | | | | |
| Inductor | I1B | DCSB Power Switch | 100 | 0.039 | 0.061 |
| Transient Voltage Suppressor | TVS1B | " | ~0 | | |
| Ultra Fast Recovery Diode | UFR1B | " | ~0 | | |
| 12v Zener Bi-Directional | D1B | " | ~0 | | |
| PMOSFET Gate Bias Resister | R1B | " | 100 | 0.002 | 0.001 |
| PMOSFET Gate Bias Resister | R2B | " | 100 | 0.000 | 0.000 |
| NMOSFET Gate Protection Resister | R3B | " | 100 | 0.003 | 0.003 |
| PMOSFET | T1B | " | 100 | 0.006 | 0.009 |
| NMOSFET | T2B | " | 100 | 0.000 | 0.000 |
| Pico Fuse | F1B | " | 100 | 0.007 | 0.011 |
| | | | | | |
| Inductor | I1C | RF Power Switch - *Rx only* | 70 | 0.010 | 0.015 |
| Transient Voltage Suppressor | TVS1C | " | ~0 | | |
| Ultra Fast Recovery Diode | UFR1C | " | ~0 | | |
| 12v Zener Bi-Directional | D1C | " | ~0 | | |
| PMOSFET Gate Bias Resister | R1C | " | 100 | 0.002 | 0.001 |
| PMOSFET Gate Bias Resister | R2C | " | 100 | 0.000 | 0.000 |
| NMOSFET Gate Protection Resister | R3C | " | 70 | 0.003 | 0.003 |
| PMOSFET | T1C | " | 70 | 0.006 | 0.009 |
| NMOSFET | T2C | " | 70 | 0.000 | 0.000 |
| Pico Fuse | F1C | " | 70 | 0.002 | 0.003 |
| | | | | | |
| Inductor | I1C | RF Power Switch - *Rx and Tx* | 30 | 0.088 | 0.138 |
| Transient Voltage Suppressor | TVS1C | " | ~0 | | |
| Ultra Fast Recovery Diode | UFR1C | " | ~0 | | |
| 12v Zener Bi-Directional | D1C | " | ~0 | | |
| PMOSFET Gate Bias Resister | R1C | " | 30 | 0.002 | 0.001 |

| Component | Designator | Subcircuit | Duty cycle | Power Dissipation, Bus = 15V (Sunlit) | Power Dissipation, Bus = 12V (Eclipse) | X-Coord | Y-Coord |
|---|---|---|---|---|---|---|---|
| PMOSFET Gate Bias Resister | R2C | " | 30 | 0.000 | 0.000 | | |
| NMOSFET Gate Protection Resister | R3C | " | 30 | 0.003 | 0.003 | | |
| PMOSFET | T1C | " | 30 | 0.014 | 0.021 | | |
| NMOSFET | T2C | " | 30 | 0.000 | 0.000 | | |
| Pico Fuse | F1C | " | 30 | 0.016 | 0.025 | | |
| | | | | | | | |
| Inductor | I1D | CHARG Battery A  Power Switch | 60 | 0.012 | N/A | 4.300 | 8.900 |
| Transient Voltage Suppressor | TVS1D | " | ~0 | | " | 5.025 | 8.637 |
| Ultra Fast Recovery Diode | UFR1D | " | ~0 | | " | 3.925 | 8.600 |
| 12v Zener Bi-Directional | D1D | " | ~0 | | " | 3.750 | 8.125 |
| PMOSFET Gate Bias Resister | R1D | " | 60 | 0.002 | " | 5.125 | 7.250 |
| PMOSFET Gate Bias Resister | R2D | " | 60 | 0.000 | " | 4.950 | 7.075 |
| NMOSFET Gate Protection Resister | R3D | " | 60 | 0.003 | 0.003 | 3.750 | 7.575 |
| PMOSFET | T1D | " | 60 | 0.008 | " | 4.475 | 7.850 |
| NMOSFET | T2D | " | 60 | 0.000 | " | 3.875 | 7.000 |
| Pico Fuse | F1D | " | 60 | 0.002 | " | 5.250 | 8.175 |
| | | | | | | | |
| Inductor | I1E | CHARG Battery B Power Switch | 60 | 0.050 | N/A | 4.300 | 6.475 |
| Transient Voltage Suppressor | TVS1E | " | ~0 | | " | 5.025 | 6.212 |
| Ultra Fast Recovery Diode | UFR1E | " | ~0 | | " | 3.925 | 6.175 |
| 12v Zener Bi-Directional | D1E | " | ~0 | | " | 3.750 | 5.700 |
| PMOSFET Gate Bias Resister | R1E | " | 60 | 0.002 | " | 5.125 | 4.825 |
| PMOSFET Gate Bias Resister | R2E | " | 60 | 0.000 | " | 4.950 | 4.650 |
| NMOSFET Gate Protection Resister | R3E | " | 60 | 0.003 | 0.003 | 3.750 | 5.150 |
| PMOSFET | T1E | " | 60 | 0.008 | " | 4.475 | 5.425 |
| NMOSFET | T2E | " | 60 | 0.000 | " | 3.875 | 4.575 |
| Pico Fuse | F1E | " | 60 | 0.050 | " | 5.250 | 5.650 |
| | | | | | | | |
| Inductor | I1F | MUX A | 30 | 0.006 | 0.009 | 8.400 | 8.875 |
| Transient Voltage Suppressor | TVS1F | " | ~0 | | | 7.297 | 9.450 |
| Ultra Fast Recovery Diode | UFR1F | " | ~0 | | | 8.125 | 9.225 |
| 12v Zener Bi-Directional | D1F | " | ~0 | | | 7.175 | 8.550 |
| PMOSFET Gate Bias Resister | R1F | " | 30 | 0.002 | 0.001 | 7.175 | 8.950 |
| PMOSFET Gate Bias Resister | R2F | " | 30 | 0.000 | 0.000 | 7.400 | 8.950 |
| NMOSFET Gate Protection Resister | R3F | " | 30 | 0.003 | 0.003 | 7.225 | 8.375 |
| PMOSFET | T1F | " | 30 | 0.003 | 0.004 | 7.775 | 9.050 |
| PMOSFET | T1F2 | " | 30 | 0.003 | 0.004 | 6.850 | 9.050 |
| NMOSFET | T2F | " | 30 | 0.000 | 0.000 | 7.775 | 8.450 |
| Pico Fuse | F1F | " | 100 | 0.001 | 0.002 | 6.475 | 9.125 |

| Component | Designator | Subcircuit | Duty cycle | Power Dissipation, Bus = 15V (Sunlit) | Power Dissipation, Bus = 12V (Eclipse) | X-Coord | Y-Coord |
|---|---|---|---|---|---|---|---|
| Inductor | I1G | MUX B | 30 | 0.006 | 0.009 | 8.400 | 7.525 |
| Transient Voltage Suppressor | TVS1G | " | ~0 | | | 7.297 | 8.100 |
| Ultra Fast Recovery Diode | UFR1G | " | ~0 | | | 8.125 | 7.875 |
| 12v Zener Bi-Directional | D1G | " | ~0 | | | 7.175 | 7.200 |
| PMOSFET Gate Bias Resister | R1G | " | 30 | 0.002 | 0.001 | 7.175 | 7.600 |
| PMOSFET Gate Bias Resister | R2G | " | 30 | 0.000 | 0.000 | 7.400 | 7.600 |
| NMOSFET Gate Protection Resister | R3G | " | 30 | 0.003 | 0.003 | 7.225 | 7.025 |
| PMOSFET | T1G | " | 30 | 0.003 | 0.004 | 7.775 | 7.700 |
| PMOSFET | T1G2 | " | 30 | 0.003 | 0.004 | 6.850 | 7.700 |
| NMOSFET | T2G | " | 30 | 0.000 | 0.000 | 7.775 | 7.100 |
| Pico Fuse | F1G | " | 100 | 0.001 | 0.009 | 6.475 | 7.775 |
| Inductor | I1H | MASS A | 30 | 0.001 | 0.002 | 8.400 | 6.175 |
| Transient Voltage Suppressor | TVS1H | " | ~0 | | | 7.297 | 6.750 |
| Ultra Fast Recovery Diode | UFR1H | " | ~0 | | | 8.125 | 6.525 |
| 12v Zener Bi-Directional | D1H | " | ~0 | | | 7.175 | 5.850 |
| PMOSFET Gate Bias Resister | R1H | " | 30 | 0.002 | 0.001 | 7.175 | 6.250 |
| PMOSFET Gate Bias Resister | R2H | " | 30 | 0.000 | 0.000 | 7.400 | 6.250 |
| NMOSFET Gate Protection Resister | R3H | " | 30 | 0.003 | 0.003 | 7.225 | 5.675 |
| PMOSFET | T1H | " | 30 | 0.001 | 0.001 | 7.775 | 6.350 |
| PMOSFET | T1H2 | " | 30 | 0.001 | 0.001 | 6.850 | 6.350 |
| NMOSFET | T2H | " | 30 | 0.000 | 0.000 | 7.775 | 5.750 |
| Pico Fuse | F1H | " | 100 | 0.000 | 0.000 | 6.475 | 6.425 |
| Inductor | I1I | MASS B | 30 | 0.001 | 0.002 | 8.400 | 4.825 |
| Transient Voltage Suppressor | TVS1I | " | ~0 | | | 7.297 | 5.400 |
| Ultra Fast Recovery Diode | UFR1I | " | ~0 | | | 8.125 | 5.175 |
| 12v Zener Bi-Directional | D1I | " | ~0 | | | 7.175 | 4.500 |
| PMOSFET Gate Bias Resister | R1I | " | 30 | 0.002 | 0.001 | 7.175 | 4.900 |
| PMOSFET Gate Bias Resister | R2I | " | 30 | 0.000 | 0.000 | 7.400 | 4.900 |
| NMOSFET Gate Protection Resister | R3I | " | 30 | 0.003 | 0.003 | 7.225 | 4.325 |
| PMOSFET | T1I | " | 30 | 0.001 | 0.001 | 7.775 | 5.000 |
| PMOSFET | T1I2 | " | 30 | 0.001 | 0.001 | 6.850 | 5.000 |
| NMOSFET | T2I | " | 30 | 0.000 | 0.000 | 7.775 | 4.400 |
| Pico Fuse | F1I | " | 100 | 0.000 | 0.000 | 6.475 | 5.075 |
| Inductor | I1J | TRICKLE A | ~0 | | | 8.400 | 3.475 |
| Transient Voltage Suppressor | TVS1J | " | ~0 | | | 7.297 | 4.050 |

| Component | Designator | Subcircuit | Duty cycle | Power Dissipation, Bus = 15V (Sunlit) | Power Dissipation, Bus = 12V (Eclipse) | X-Coord | Y-Coord |
|---|---|---|---|---|---|---|---|
| Ultra Fast Recovery Diode | UFR1J | " | ~0 | | | 8.125 | 3.825 |
| 12v Zener Bi-Directional | D1J | " | ~0 | | | 7.175 | 3.150 |
| PMOSFET Gate Bias Resister | R1J | " | ~0 | | | 7.175 | 3.550 |
| PMOSFET Gate Bias Resister | R2J | " | ~0 | | | 7.400 | 3.550 |
| NMOSFET Gate Protection Resister | R3J | " | ~0 | | | 7.225 | 2.975 |
| PMOSFET | T1J | " | ~0 | | | 7.775 | 3.650 |
| PMOSFET | T1J2 | " | ~0 | | | 6.850 | 3.650 |
| NMOSFET | T2J | " | ~0 | | | 7.775 | 3.050 |
| Pico Fuse | F1J | " | ~0 | | | 6.475 | 3.725 |
| | | | | | | | |
| Inductor | I1K | TRICKLE B | ~0 | | | 8.400 | 2.100 |
| Transient Voltage Suppressor | TVS1K | " | ~0 | | | 7.297 | 2.675 |
| Ultra Fast Recovery Diode | UFR1K | " | ~0 | | | 8.125 | 2.450 |
| 12v Zener Bi-Directional | D1K | " | ~0 | | | 7.175 | 1.775 |
| PMOSFET Gate Bias Resister | R1K | " | ~0 | | | 7.175 | 2.175 |
| PMOSFET Gate Bias Resister | R2K | " | ~0 | | | 7.400 | 2.175 |
| NMOSFET Gate Bias Resister | R3K | " | ~0 | | | 7.225 | 1.600 |
| PMOSFET | T1K | " | ~0 | | | 7.775 | 2.275 |
| PMOSFET | T1K2 | " | ~0 | | | 6.850 | 2.275 |
| NMOSFET | T2K | " | ~0 | | | 7.775 | 1.675 |
| Pico Fuse | F1K | " | ~0 | | | 6.475 | 2.350 |
| | | | | | | | |
| NMOSFET | T3A | Discharge Battery A | | | | 5.750 | 5.300 |
| NMOSFET | T3B | Discharge Battery B | | | | 5.775 | 3.650 |
| LM150 | IS1A | Constant Current Source | | | | 3.975 | 3.092 |
| LM150 | IS1B | Constant Current Source | | | | 5.225 | 3.092 |
| | | | Total Power | #REF! | 0.280W | | |

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# APPENDIX K.   ITAS THERMAL MASS/DISSIPATIONS

```
ëëCtrl:Copyëëëëëëë ITAS Node Data Entry For Thermal Analysis ëëëëëëëëëESC:Quitëf
□                                                                              □
□ SEQN    NodeNo    Temp-C    ThrMass   Dissip    Comment                      □
□    1    901       30        -1.870    0         EPS HOUSING WALL             □
□    2    902       30        -.4179    0         EPS HOUSING WALL             □
□    3    903       30        -.4179    0         EPS HOUSING WALL             □
□    4    904       30        -.4179    0         EPS HOUSING WALL             □
□    5    905       30         .4179    0         EPS HOUSING WALL             □
□    6    906       30        -10.15    0         BOTTOM EPS HOUSING           □
□    7    907       30        -1.871    0         EPS HOUSING WALL             □
□    8    908       30        -.4179    0         EPS HOUSING WALL             □
□    9.   909       30        -.4179    0         EPS HOUSING WALL             □
□   10    910       30        -.4179    0         EPS HOUSING WALL             □
□   11    911       30        -.4179    0         EPS HOUSING WALL             □
□   12    912       30        -10.02    0         EPS HOUSING WALL             □
□   13    913       30        -6.259    0         EQUIPMENT PLATE TO BOTTOM EPS □
□   14    921       30        -.2664    0         BOTTOM RAIL  (+Y)            □
□   15    922       30        -.3995    0         MIDDLE RAIL  (+Y)            □
□   16    923       30        -.2120    0         TOP RAIL     (+Y)            □
□   17    924       30        -.2664    0         BOTTOM RAIL  (-Y)            □
□   18    925       30        -.3995    0         MIDDLE RAIL  (-Y)            □
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CTRL-F1Import ITAS_NC    UDC Allowed                      PgDn PgUp Home End
SHFT-F1Import Column                          Shift-F5Del/Pur
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

ëëCtrl:Copyëëëëëëë ITAS Node Data Entry For Thermal Analysis ëëëëëëëëëESC:Quitëf
□                                                                              □
□ SEQN    NodeNo    Temp-C    ThrMass   Dissip    Comment                      □
□   19    926       30        -.2120    0         TOP RAIL (-Y)                □
□   20    601       30        -.0043    0         TOP PCB THERMAL LAYER        □
□   21    602       30        -.0058    0                                      □
□   22    603       30        -.0016    0                                      □
□   23    604       30        -.0062    0                                      □
□   24    605       30        -.0016    0                                      □
□   25    606       30        -.0085    0                                      □
□   26    607       30        -.0051    0                                      □
□   27    608       30        -.0070    0                                      □
□   28    609       30        -.0019    0                                      □
□   29    610       30        -.0075    0                                      □
□   30    611       30        -.0019    0                                      □
□   31    612       30        -.0103    0                                      □
□   32    613       30        -.0019    0                                      □
□   33    614       30        -.0015    0                                      □
□   34    615       30        -.0015    0                                      □
□   35    616       30        -.0015    0                                      □
□   36    617       30        -.0015    0                                      □
àëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëv
CTRL-F1Import ITAS_NC    UDC Allowed                      PgDn PgUp Home End
SHFT-F1Import Column                          Shift-F5Del/Pur
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 37 | 618 | 30 | -.0019 | 0 | TOP PCB THERMAL LAYER |
| 38 | 619 | 30 | -.0024 | 0 | |
| 39 | 620 | 30 | -.0019 | 0 | |
| 40 | 621 | 30 | -.0019 | 0 | |
| 41 | 622 | 30 | -.0019 | 0 | |
| 42 | 623 | 30 | -.0019 | 0 | |
| 43 | 624 | 30 | -.0024 | 0 | |
| 44 | 625 | 30 | -.0016 | 0 | |
| 45 | 626 | 30 | -.0016 | 0 | |
| 46 | 627 | 30 | -.0016 | 0 | |
| 47 | 628 | 30 | -.0016 | 0 | |
| 48 | 629 | 30 | -.0016 | 0 | |
| 49 | 630 | 30 | -.0020 | 0 | |
| 50 | 1601 | 30 | -.0104 | 0 | BOTTOM PCB THERMAL LAYER |
| 51 | 1602 | 30 | -.0061 | 0 | BOTTOM PCB THERMAL LAYER |
| 52 | 1603 | 30 | -.0044 | 0 | BOTTOM PCB THERMAL LAYER |
| 53 | 1604 | 30 | -.0051 | 0 | BOTTOM PCB THERMAL LAYER |
| 54 | 1605 | 30 | -.0020 | 0 | BOTTOM PCB THERMAL LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 55 | 1606 | 30 | -.0098 | 0 | BOTTOM PCB THERMAL LAYER |
| 56 | 1607 | 30 | -.0031 | 0 | BOTTOM PCB THERMAL LAYER |
| 57 | 1608 | 30 | -.0022 | 0 | BOTTOM PCB THERMAL LAYER |
| 58 | 1609 | 30 | -.0028 | 0 | BOTTOM PCB THERMAL LAYER |
| 59 | 1610 | 30 | -.0007 | 0 | BOTTOM PCB THERMAL LAYER |
| 60 | 1611 | 30 | -.0010 | 0 | BOTTOM PCB THERMAL LAYER |
| 61 | 1612 | 30 | -.0010 | 0 | BOTTOM PCB THERMAL LAYER |
| 62 | 1613 | 30 | -.0049 | 0 | BOTTOM PCB THERMAL LAYER |
| 63 | 1614 | 30 | -.0071 | 0 | BOTTOM PCB THERMAL LAYER |
| 64 | 1615 | 30 | -.0111 | 0 | BOTTOM PCB THERMAL LAYER |
| 65 | 1616 | 30 | -.0137 | 0 | BOTTOM PCB THERMAL LAYER |
| 66 | 1617 | 30 | -.0046 | 0 | BOTTOM PCB THERMAL LAYER |
| 67 | 501 | 30 | -.0436 | 0 | TOP PCB BOTTOM POLY LAYER |
| 68 | 502 | 30 | -.0595 | 0 | TOP PCB BOTTOM POLY LAYER |
| 69 | 503 | 30 | -.0159 | 0 | TOP PCB BOTTOM POLY LAYER |
| 70 | 504 | 30 | -.0635 | 0 | TOP PCB BOTTOM POLY LAYER |
| 71 | 505 | 30 | -.0159 | 0 | TOP PCB BOTTOM POLY LAYER |
| 72 | 506 | 30 | -0.087 | 0 | TOP PCB BOTTOM POLY LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 73 | 507 | 30 | -.0528 | 0 | TOP PCB BOTTOM POLY LAYER |
| 74 | 508 | 30 | -.0720 | 0 | TOP PCB BOTTOM POLY LAYER |
| 75 | 509 | 30 | -.0192 | 0 | TOP PCB BOTTOM POLY LAYER |
| 76 | 510 | 30 | -.0768 | 0 | TOP PCB BOTTOM POLY LAYER |
| 77 | 511 | 30 | -.0192 | 0 | TOP PCB BOTTOM POLY LAYER |
| 78 | 512 | 30 | -.1056 | 0 | TOP PCB BOTTOM POLY LAYER |
| 79 | 513 | 30 | -.0190 | 0 | TOP PCB BOTTOM POLY LAYER |
| 80 | 514 | 30 | -.0149 | 0 | TOP PCB BOTTOM POLY LAYER |
| 81 | 515 | 30 | -.0149 | 0 | TOP PCB BOTTOM POLY LAYER |
| 82 | 516 | 30 | -.0149 | 0 | TOP PCB BOTTOM POLY LAYER |
| 83 | 517 | 30 | -.0149 | 0 | TOP PCB BOTTOM POLY LAYER |
| 84 | 518 | 30 | -.0190 | 0 | TOP PCB BOTTOM POLY LAYER |
| 85 | 519 | 30 | -.0248 | 0 | TOP PCB BOTTOM POLY LAYER |
| 86 | 520 | 30 | -.0195 | 0 | TOP PCB BOTTOM POLY LAYER |
| 87 | 521 | 30 | -.0195 | 0 | TOP PCB BOTTOM POLY LAYER |
| 88 | 522 | 30 | -.0195 | 0 | TOP PCB BOTTOM POLY LAYER |
| 89 | 523 | 30 | -.0195 | 0 | TOP PCB BOTTOM POLY LAYER |
| 90 | 524 | 30 | -.0248 | 0 | TOP PCB BOTTOM POLY LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 91 | 525 | 30 | -.0161 | 0 | TOP PCB BOTTOM POLY LAYER |
| 92 | 526 | 30 | -.0161 | 0 | TOP PCB BOTTOM POLY LAYER |
| 93 | 527 | 30 | -.0161 | 0 | TOP PCB BOTTOM POLY LAYER |
| 94 | 528 | 30 | -.0161 | 0 | TOP PCB BOTTOM POLY LAYER |
| 95 | 529 | 30 | -.0161 | 0 | TOP PCB BOTTOM POLY LAYER |
| 96 | 530 | 30 | -.0205 | 0 | TOP PCB BOTTOM POLY LAYER |
| 97 | 1501 | 30 | -.1069 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 98 | 1502 | 30 | -.0627 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 99 | 1503 | 30 | -.0451 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 100 | 1504 | 30 | -.0526 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 101 | 1505 | 30 | -.0200 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 102 | 1506 | 30 | -.1002 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 103 | 1507 | 30 | -.0313 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 104 | 1508 | 30 | -.0226 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 105 | 1509 | 30 | -.0288 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 106 | 1510 | 30 | -.0075 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 107 | 1511 | 30 | -.0100 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 108 | 1512 | 30 | -.0100 | 0 | BOTTOM PCB BOTTOM POLY LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 109 | 1513 | 30 | -.0501 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 110 | 1514 | 30 | -.0731 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 111 | 1515 | 30 | -.1140 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 112 | 1516 | 30 | -.1403 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 113 | 1517 | 30 | -.0468 | 0 | BOTTOM PCB BOTTOM POLY LAYER |
| 114 | 401 | 30 | -.0043 | 0 | TOP PCB THERMAL COPPER LAYER |
| 115 | 402 | 30 | -.0058 | 0 | TOP PCB THERMAL COPPER LAYER |
| 116 | 403 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 117 | 404 | 30 | -.0062 | 0 | TOP PCB THERMAL COPPER LAYER |
| 118 | 405 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 119 | 406 | 30 | -.0085 | 0 | TOP PCB THERMAL COPPER LAYER |
| 120 | 407 | 30 | -.0051 | 0 | TOP PCB THERMAL COPPER LAYER |
| 121 | 408 | 30 | -.0071 | 0 | TOP PCB THERMAL COPPER LAYER |
| 122 | 409 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 123 | 410 | 30 | -.0075 | 0 | TOP PCB THERMAL COPPER LAYER |
| 124 | 411 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 125 | 412 | 30 | -.0103 | 0 | TOP PCB THERMAL COPPER LAYER |
| 126 | 413 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |

```
CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                      Shift-F5Del/Pur
       FlSave/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 127 | 414 | 30 | -.0015 | 0 | TOP PCB THERMAL COPPER LAYER |
| 128 | 415 | 30 | -.0015 | 0 | TOP PCB THERMAL COPPER LAYER |
| 129 | 416 | 30 | -.0015 | 0 | TOP PCB THERMAL COPPER LAYER |
| 130 | 417 | 30 | -.0015 | 0 | TOP PCB THERMAL COPPER LAYER |
| 131 | 418 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 132 | 419 | 30 | -.0024 | 0 | TOP PCB THERMAL COPPER LAYER |
| 133 | 420 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 134 | 421 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 135 | 422 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 136 | 423 | 30 | -.0019 | 0 | TOP PCB THERMAL COPPER LAYER |
| 137 | 424 | 30 | -.0024 | 0 | TOP PCB THERMAL COPPER LAYER |
| 138 | 425 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 139 | 426 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 140 | 427 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 141 | 428 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 142 | 429 | 30 | -.0016 | 0 | TOP PCB THERMAL COPPER LAYER |
| 143 | 430 | 30 | -.0020 | 0 | TOP PCB THERMAL COPPER LAYER |
| 144 | 1401 | 30 | -.0104 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |

```
CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                      Shift-F5Del/Pur
       FlSave/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 145 | 1402 | 30 | -.0061 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 146 | 1403 | 30 | -.0044 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 147 | 1404 | 30 | -.0051 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 148 | 1405 | 30 | -.0020 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 149 | 1406 | 30 | -.0098 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 150 | 1407 | 30 | -.0031 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 151 | 1408 | 30 | -.0022 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 152 | 1409 | 30 | -.0028 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 153 | 1410 | 30 | -.0007 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 154 | 1411 | 30 | -.0010 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 155 | 1412 | 30 | -.0010 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 156 | 1413 | 30 | -.0049 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 157 | 1414 | 30 | -.0071 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 158 | 1415 | 30 | -.0111 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 159 | 1416 | 30 | -.0137 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 160 | 1417 | 30 | -.0046 | 0 | BOTTOM PCB GROUND (COPPER) LAYER |
| 161 | 301 | 30 | -.0436 | 0 | TOP PCB MIDDLE POLY LAYER |
| 162 | 302 | 30 | -.0595 | 0 | TOP PCB MIDDLE POLY LAYER |

```
CTRL-F1Import ITAS_NC   UDC Allowed                    PgDn PgUp Home End
SHFT-F1Import Column                    Shift-F5Del/Pur
      F1Save/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 163 | 303 | 30 | -.0159 | 0 | TOP PCB MIDDLE POLY LAYER |
| 164 | 304 | 30 | -.0635 | 0 | TOP PCB MIDDLE POLY LAYER |
| 165 | 305 | 30 | -.0159 | 0 | TOP PCB MIDDLE POLY LAYER |
| 166 | 306 | 30 | -.0873 | 0 | TOP PCB MIDDLE POLY LAYER |
| 167 | 307 | 30 | -.0528 | 0 | TOP PCB MIDDLE POLY LAYER |
| 168 | 308 | 30 | -.0720 | 0 | TOP PCB MIDDLE POLY LAYER |
| 169 | 309 | 30 | -.0192 | 0 | TOP PCB MIDDLE POLY LAYER |
| 170 | 310 | 30 | -.0768 | 0 | TOP PCB MIDDLE POLY LAYER |
| 171 | 311 | 30 | -.0192 | 0 | TOP PCB MIDDLE POLY LAYER |
| 172 | 312 | 30 | -.1056 | 0 | TOP PCB MIDDLE POLY LAYER |
| 173 | 313 | 30 | -.0190 | 0 | TOP PCB MIDDLE POLY LAYER |
| 174 | 314 | 30 | -.0149 | 0 | TOP PCB MIDDLE POLY LAYER |
| 175 | 315 | 30 | -.0149 | 0 | TOP PCB MIDDLE POLY LAYER |
| 176 | 316 | 30 | -.0149 | 0 | TOP PCB MIDDLE POLY LAYER |
| 177 | 317 | 30 | -.0149 | 0 | TOP PCB MIDDLE POLY LAYER |
| 178 | 318 | 30 | -.0190 | 0 | TOP PCB MIDDLE POLY LAYER |
| 179 | 319 | 30 | -.0248 | 0 | TOP PCB MIDDLE POLY LAYER |
| 180 | 320 | 30 | -.0195 | 0 | TOP PCB MIDDLE POLY LAYER |

```
CTRL-F1Import ITAS_NC   UDC Allowed                    PgDn PgUp Home End
SHFT-F1Import Column                    Shift-F5Del/Pur
      F1Save/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 181 | 321 | 30 | -.0195 | 0 | TOP PCB MIDDLE POLY LAYER |
| 182 | 322 | 30 | -.0195 | 0 | TOP PCB MIDDLE POLY LAYER |
| 183 | 323 | 30 | -.0195 | 0 | TOP PCB MIDDLE POLY LAYER |
| 184 | 324 | 30 | -.0248 | 0 | TOP PCB MIDDLE POLY LAYER |
| 185 | 325 | 30 | -.0161 | 0 | TOP PCB MIDDLE POLY LAYER |
| 186 | 326 | 30 | -.0161 | 0 | TOP PCB MIDDLE POLY LAYER |
| 187 | 327 | 30 | -.0161 | 0 | TOP PCB MIDDLE POLY LAYER |
| 188 | 328 | 30 | -.0161 | 0 | TOP PCB MIDDLE POLY LAYER |
| 189 | 329 | 30 | -.0161 | 0 | TOP PCB MIDDLE POLY LAYER |
| 190 | 330 | 30 | -.0205 | 0 | TOP PCB MIDDLE POLY LAYER |
| 191 | 1301 | 30 | -.1069 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 192 | 1302 | 30 | -.0627 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 193 | 1303 | 30 | -.0451 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 194 | 1304 | 30 | -.0526 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 195 | 1305 | 30 | -.0200 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 196 | 1306 | 30 | -.1000 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 197 | 1307 | 30 | -.0313 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 198 | 1308 | 30 | -.0226 | 0 | BOTTOM PCB MIDDLE POLY LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 199 | 1309 | 30 | -.0288 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 200 | 1310 | 30 | -.0075 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 201 | 1311 | 30 | -.0100 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 202 | 1312 | 30 | -.0100 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 203 | 1313 | 30 | -.0501 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 204 | 1314 | 30 | -.0731 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 205 | 1315 | 30 | -.1140 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 206 | 1316 | 30 | -.1403 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 207 | 1317 | 30 | -.0468 | 0 | BOTTOM PCB MIDDLE POLY LAYER |
| 208 | 201 | 30 | -.0043 | 0 | TOP PCB TOP COPPER LAYER |
| 209 | 202 | 30 | -.0058 | 0 | TOP PCB TOP COPPER LAYER |
| 210 | 203 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 211 | 204 | 30 | -.0062 | 0 | TOP PCB TOP COPPER LAYER |
| 212 | 205 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 213 | 206 | 30 | -.0085 | 0 | TOP PCB TOP COPPER LAYER |
| 214 | 207 | 30 | -.0051 | 0 | TOP PCB TOP COPPER LAYER |
| 215 | 208 | 30 | -.0070 | 0 | TOP PCB TOP COPPER LAYER |
| 216 | 209 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 217 | 210 | 30 | -.0075 | 0 | TOP PCB TOP COPPER LAYER |
| 218 | 211 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 219 | 212 | 30 | -.0103 | 0 | TOP PCB TOP COPPER LAYER |
| 220 | 213 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 221 | 214 | 30 | -.0015 | 0 | TOP PCB TOP COPPER LAYER |
| 222 | 215 | 30 | -.0015 | 0 | TOP PCB TOP COPPER LAYER |
| 223 | 216 | 30 | -.0015 | 0 | TOP PCB TOP COPPER LAYER |
| 224 | 217 | 30 | -.0015 | 0 | TOP PCB TOP COPPER LAYER |
| 225 | 218 | 30 | -.0187 | 0 | TOP PCB TOP COPPER LAYER |
| 226 | 219 | 30 | -.0024 | 0 | TOP PCB TOP COPPER LAYER |
| 227 | 220 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 228 | 221 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 229 | 222 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 230 | 223 | 30 | -.0019 | 0 | TOP PCB TOP COPPER LAYER |
| 231 | 224 | 30 | -.0024 | 0 | TOP PCB TOP COPPER LAYER |
| 232 | 225 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 233 | 226 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 234 | 227 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 235 | 228 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 236 | 229 | 30 | -.0016 | 0 | TOP PCB TOP COPPER LAYER |
| 237 | 230 | 30 | -.0020 | 0 | TOP PCB TOP COPPER LAYER |
| 238 | 1201 | 30 | -.0104 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 239 | 1202 | 30 | -.0061 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 240 | 1203 | 30 | -.0044 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 241 | 1204 | 30 | -.0051 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 242 | 1205 | 30 | -.0020 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 243 | 1206 | 30 | -.0098 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 244 | 1207 | 30 | -.0031 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 245 | 1208 | 30 | -.0022 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 246 | 1209 | 30 | -.0028 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 247 | 1210 | 30 | -.0007 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 248 | 1211 | 30 | -.0010 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 249 | 1212 | 30 | -.0010 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 250 | 1213 | 30 | -.0049 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 251 | 1214 | 30 | -.0071 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 252 | 1215 | 30 | -.0111 | 0 | BOTTOM PCB TOP COPPER LAYER |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 253 | 1216 | 30 | -.0137 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 254 | 1217 | 30 | -.0046 | 0 | BOTTOM PCB TOP COPPER LAYER |
| 255 | 101 | 30 | -.0436 | 0 | TOP PCB TOP POLY LAYER |
| 256 | 102 | 30 | -.0595 | 0 | TOP PCB TOP POLY LAYER |
| 257 | 103 | 30 | -.0159 | 0 | TOP PCB TOP POLY LAYER |
| 258 | 104 | 30 | -.0635 | 0 | TOP PCB TOP POLY LAYER |
| 259 | 105 | 30 | -.0159 | 0 | TOP PCB TOP POLY LAYER |
| 260 | 106 | 30 | -.0873 | 0 | TOP PCB TOP POLY LAYER |
| 261 | 107 | 30 | -.0528 | 0 | TOP PCB TOP POLY LAYER |
| 262 | 108 | 30 | -.0720 | 0 | TOP PCB TOP POLY LAYER |
| 263 | 109 | 30 | -.0192 | 0 | TOP PCB TOP POLY LAYER |
| 264 | 110 | 30 | -.0768 | 0 | TOP PCB TOP POLY LAYER |
| 265 | 111 | 30 | -.0192 | 0 | TOP PCB TOP POLY LAYER |
| 266 | 112 | 30 | -.1056 | 0 | TOP PCB TOP POLY LAYER |
| 267 | 113 | 30 | -.0190 | 0 | TOP PCB TOP POLY LAYER |
| 268 | 114 | 30 | -.0149 | 0 | TOP PCB TOP POLY LAYER |
| 269 | 115 | 30 | -.0149 | 0 | TOP PCB TOP POLY LAYER |
| 270 | 116 | 30 | -.0149 | 0 | TOP PCB TOP POLY LAYER |

CTRL-F1Import ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-F1Import Column                      Shift-F5Del/Pur
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 271 | 117 | 30 | -.0149 | 0 | TOP PCB TOP POLY LAYER |
| 272 | 118 | 30 | -.0190 | 0 | TOP PCB TOP POLY LAYER |
| 273 | 119 | 30 | -.0248 | 0 | TOP PCB TOP POLY LAYER |
| 274 | 120 | 30 | -.0195 | 0 | TOP PCB TOP POLY LAYER |
| 275 | 121 | 30 | -.0195 | 0 | TOP PCB TOP POLY LAYER |
| 276 | 122 | 30 | -.0195 | 0 | TOP PCB TOP POLY LAYER |
| 277 | 123 | 30 | -.0195 | 0 | TOP PCB TOP POLY LAYER |
| 278 | 124 | 30 | -.0248 | 0 | TOP PCB TOP POLY LAYER |
| 279 | 125 | 30 | -.0161 | 0 | TOP PCB TOP POLY LAYER |
| 280 | 126 | 30 | -.0161 | 0 | TOP PCB TOP POLY LAYER |
| 281 | 127 | 30 | -.0161 | 0 | TOP PCB TOP POLY LAYER |
| 282 | 128 | 30 | -.0161 | 0 | TOP PCB TOP POLY LAYER |
| 283 | 129 | 30 | -.0161 | 0 | TOP PCB TOP POLY LAYER |
| 284 | 130 | 30 | -.0205 | 0 | TOP PCB TOP POLY LAYER |
| 285 | 1101 | 30 | -.1069 | 0 | BOTTOM PCB TOP POLY LAYER |
| 286 | 1102 | 30 | -.0627 | 0 | BOTTOM PCB TOP POLY LAYER |
| 287 | 1103 | 30 | -.0451 | 0 | BOTTOM PCB TOP POLY LAYER |
| 288 | 1104 | 30 | -.0526 | 0 | BOTTOM PCB TOP POLY LAYER |

CTRL-F1Import ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-F1Import Column                      Shift-F5Del/Pur
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 289 | 1105 | 30 | -.0200 | 0 | BOTTOM PCB TOP POLY LAYER |
| 290 | 1106 | 30 | -.1000 | 0 | BOTTOM PCB TOP POLY LAYER |
| 291 | 1107 | 30 | -.0313 | 0 | BOTTOM PCB TOP POLY LAYER |
| 292 | 1108 | 30 | -.0226 | 0 | BOTTOM PCB TOP POLY LAYER |
| 293 | 1109 | 30 | -.0288 | 0 | BOTTOM PCB TOP POLY LAYER |
| 294 | 1110 | 30 | -.0075 | 0 | BOTTOM PCB TOP POLY LAYER |
| 295 | 1111 | 30 | -.0100 | 0 | BOTTOM PCB TOP POLY LAYER |
| 296 | 1112 | 30 | -.0100 | 0 | BOTTOM PCB TOP POLY LAYER |
| 297 | 1113 | 30 | -.0501 | 0 | BOTTOM PCB TOP POLY LAYER |
| 298 | 1114 | 30 | -.0731 | 0 | BOTTOM PCB TOP POLY LAYER |
| 299 | 1115 | 30 | -.1140 | 0 | BOTTOM PCB TOP POLY LAYER |
| 300 | 1116 | 30 | -.1403 | 0 | BOTTOM PCB TOP POLY LAYER |
| 301 | 1117 | 30 | -.0468 | 0 | BOTTOM PCB TOP POLY LAYER |
| 302 | 2011 | 30 | -.0001 | .039 | PIN THROUGH NODE 3.01 |
| 303 | 2012 | 30 | -.0001 | 0 | PIN THROUGH NODE 3.01 |
| 304 | 2013 | 30 | -.0001 | 0 | PIN THROUGH NODE 3.01 |
| 305 | 2014 | 30 | -.0001 | 0 | PIN THROUGH NODE 3.01 |
| 306 | 2015 | 30 | -.0001 | 0 | PIN THROUGH NODE 3.01 |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 307 | 2016 | 30 | -.0001 | 0 | PIN THROUGH NODE 3.01 |
| 308 | 2021 | 30 | -.0004 | .018 | PIN THROUGH 3.02 POLY LAYERS |
| 309 | 2023 | 30 | -.0004 | 0 | PIN THROUGH 3.02 POLY LAYERS |
| 310 | 2025 | 30 | -.0004 | 0 | PIN THROUGH 3.02 POLY LAYERS |
| 311 | 2022 | 30 | -.0001 | 0 | PIN THROUGH 3.02 COPPER LAYERS |
| 312 | 2024 | 30 | -.0001 | 0 | PIN THROUGH 3.02 COPPER LAYERS |
| 313 | 2026 | 30 | -.0001 | 0 | PIN THROUGH 3.02 COPPER LAYERS |
| 314 | 2031 | 30 | -.0001 | .039 | PIN THROUGH 3.03 POLY LAYERS |
| 315 | 2033 | 30 | -.0001 | 0 | PIN THROUGH 3.03 POLY LAYERS |
| 316 | 2035 | 30 | -.0001 | 0 | PIN THROUGH 3.03 POLY LAYERS |
| 317 | 2032 | 30 | -.0001 | 0 | PIN THROUGH 3.03 COPPER LAYERS |
| 318 | 2034 | 30 | -.0001 | 0 | PIN THROUGH 3.03 COPPER LAYERS |
| 319 | 2036 | 30 | -.0001 | 0 | PIN THROUGH 3.03 COPPER LAYERS |
| 320 | 2041 | 30 | -.0004 | .018 | PIN THROUGH 3.04 POLY LAYERS |
| 321 | 2043 | 30 | -.0004 | 0 | PIN THROUGH 3.04 POLY LAYERS |
| 322 | 2045 | 30 | -.0004 | 0 | PIN THROUGH 3.04 POLY LAYERS |
| 323 | 2042 | 30 | -.0001 | 0 | PIN THROUGH 3.04 COPPER LAYERS |
| 324 | 2044 | 30 | -.0001 | 0 | PIN THROUGH 3.04 COPPER LAYERS |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 325 | 2046 | 30 | -.0001 | 0 | PIN THROUGH 3.04 COPPER LAYERS |
| 326 | 2051 | 30 | -.0001 | .088 | PIN THROUGH 3.05 POLY LAYERS |
| 327 | 2053 | 30 | -.0001 | 0 | PIN THROUGH 3.05 POLY LAYERS |
| 328 | 2055 | 30 | -.0001 | 0 | PIN THROUGH 3.05 POLY LAYERS |
| 329 | 2061 | 30 | -.0004 | .035 | PIN THROUGH 3.06 POLY LAYERS |
| 330 | 2063 | 30 | -.0004 | 0 | PIN THROUGH 3.06 POLY LAYERS |
| 331 | 2065 | 30 | -.0004 | 0 | PIN THROUGH 3.06 POLY LAYERS |
| 332 | 2052 | 30 | -.0001 | 0 | PIN THROUGH 3.05 COPPER LAYERS |
| 333 | 2054 | 30 | -.0001 | 0 | PIN THROUGH 3.05 COPPER LAYERS |
| 334 | 2062 | 30 | -.0001 | 0 | PIN THROUGH 3.06 COPPER LAYER |
| 335 | 2064 | 30 | -.0001 | 0 | PIN THROUGH 3.06 COPPER LAYER |
| 336 | 2066 | 30 | -.0001 | 0 | PIN THROUGH 3.06 COPPER LAYER |
| 337 | 2071 | 30 | -.0001 | .012 | PIN THROUGH 3.07 POLY LAYERS |
| 338 | 2073 | 30 | -.0001 | 0 | PIN THROUGH 3.07 POLY LAYERS |
| 339 | 2075 | 30 | -.0001 | 0 | PIN THROUGH 3.07 POLY LAYERS |
| 340 | 2072 | 30 | -.0001 | 0 | PIN THROUGH 3.07 COPPER LAYERS |
| 341 | 2074 | 30 | -.0001 | 0 | PIN THROUGH 3.07 COPPER LAYERS |
| 342 | 2076 | 30 | -.0001 | 0 | PIN THROUGH 3.07 COPPER LAYERS |

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| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 343 | 2081 | 30 | -.0004 | .015 | PIN THROUGH 3.08 POLY LAYERS |
| 344 | 2083 | 30 | -.0004 | 0 | PIN THROUGH 3.08 POLY LAYERS |
| 345 | 2085 | 30 | -.0004 | 0 | PIN THROUGH 3.08 POLY LAYERS |
| 346 | 2082 | 30 | -.0001 | 0 | PIN THROUGH 3.08 COPPER LAYERS |
| 347 | 2084 | 30 | -.0001 | 0 | PIN THROUGH 3.08 COPPER LAYERS |
| 348 | 2086 | 30 | -.0001 | 0 | PIN THROUGH 3.08 COPPER LAYERS |
| 349 | 2091 | 30 | -.0001 | .05 | PIN THROUGH 3.09 POLY LAYERS |
| 350 | 2093 | 30 | -.0001 | 0 | PIN THROUGH 3.09 POLY LAYERS |
| 351 | 2095 | 30 | -.0001 | 0 | PIN THROUGH 3.09 POLY LAYERS |
| 352 | 2092 | 30 | -.0001 | 0 | PIN THROUGH 3.09 COPPER LAYERS |
| 353 | 2094 | 30 | -.0001 | 0 | PIN THROUGH 3.09 COPPER LAYERS |
| 354 | 2096 | 30 | -.0001 | 0 | PIN THROUGH 3.09 COPPER LAYERS |
| 355 | 2101 | 30 | -.0004 | .015 | PIN THROUGH 3.10 POLY LAYERS |
| 356 | 2103 | 30 | -.0004 | 0 | PIN THROUGH 3.10 POLY LAYERS |
| 357 | 2105 | 30 | -.0004 | 0 | PIN THROUGH 3.10 POLY LAYERS |
| 358 | 2102 | 30 | -.0001 | 0 | PIN THROUGH 3.10 COPPER LAYERS |
| 359 | 2104 | 30 | -.0001 | 0 | PIN THROUGH 3.10 COPPER LAYERS |
| 360 | 2106 | 30 | -.0001 | 0 | PIN THROUGH 3.10 COPPER LAYERS |

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| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 361 | 2111 | 30 | -.0001 | 0 | PIN THROUGH 3.11 POLY LAYERS |
| 362 | 2113 | 30 | -.0001 | 0 | PIN THROUGH 3.11 POLY LAYERS |
| 363 | 2115 | 30 | -.0001 | 0 | PIN THROUGH 3.11 POLY LAYERS |
| 364 | 2112 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYERS |
| 365 | 2114 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYERS |
| 366 | 2116 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYERS |
| 367 | 2121 | 30 | -.0002 | 0 | PIN THROUGH 3.12 POLY LAYER |
| 368 | 2123 | 30 | -.0002 | 0 | PIN THROUGH 3.12 POLY LAYER |
| 369 | 2125 | 30 | -.0002 | 0 | PIN THROUGH 3.12 POLY LAYER |
| 370 | 2122 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYERS |
| 371 | 2131 | 30 | -.0001 | .004 | PIN THROUGH 2.01 POLY LAYER |
| 372 | 2133 | 30 | -.0001 | 0 | PIN THROUGH 2.01 POLY LAYER |
| 373 | 2135 | 30 | -.0001 | 0 | PIN THROUGH 2.01 POLY LAYER |
| 374 | 2132 | 30 | -.0001 | 0 | PIN THROUGH 2.01 COPPER LAYERS |
| 375 | 2134 | 30 | -.0001 | 0 | PIN THROUGH 2.01 COPPER LAYERS |
| 376 | 2136 | 30 | -.0001 | 0 | PIN THROUGH 2.01 COPPER LAYERS |
| 377 | 2141 | 30 | -.0001 | .004 | PIN THROUGH 2.02 POLY LAYERS |
| 378 | 2143 | 30 | -.0001 | 0 | PIN THROUGH 2.02 POLY LAYERS |

```
CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                        Shift-F5Del/Pur
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 379 | 2145 | 30 | -.0001 | 0 | PIN THROUGH 2.02 POLY LAYERS |
| 380 | 2142 | 30 | -.0001 | 0 | PIN THROUGH 2.02 COPPER LAYERS |
| 381 | 2144 | 30 | -.0001 | 0 | PIN THROUGH 2.02 COPPER LAYERS |
| 382 | 2146 | 30 | -.0001 | 0 | PIN THROUGH 2.02 COPPER LAYERS |
| 383 | 2151 | 30 | -.0001 | .001 | PIN THROUGH 2.03 POLY LAYER |
| 384 | 2153 | 30 | -.0001 | 0 | PIN THROUGH 2.03 POLY LAYER |
| 385 | 2155 | 30 | -.0001 | 0 | PIN THROUGH 2.03 POLY LAYER |
| 386 | 2152 | 30 | -.0001 | 0 | PIN THROUGH 2.03 COPPER LAYERS |
| 387 | 2154 | 30 | -.0001 | 0 | PIN THROUGH 2.03 COPPER LAYERS |
| 388 | 2156 | 30 | -.0001 | 0 | PIN THROUGH 2.03 COPPER LAYERS |
| 389 | 2161 | 30 | -.0001 | .001 | PIN THROUGH 2.04 POLY LAYER |
| 390 | 2163 | 30 | -.0001 | 0 | PIN THROUGH 2.04 POLY LAYER |
| 391 | 2165 | 30 | -.0001 | 0 | PIN THROUGH 2.04 POLY LAYER |
| 392 | 2162 | 30 | -.0001 | 0 | PIN THROUGH 2.04 COPPER LAYERS |
| 393 | 2164 | 30 | -.0001 | 0 | PIN THROUGH 2.04 COPPER LAYERS |
| 394 | 2166 | 30 | -.0001 | 0 | PIN THROUGH 2.04 COPPER LAYERS |
| 395 | 2171 | 30 | -.0001 | 0 | PIN THROUGH 2.05 POLY LAYERS |
| 396 | 2173 | 30 | -.0001 | 0 | PIN THROUGH 2.05 POLY LAYERS |

```
CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                        Shift-F5Del/Pur
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 397 | 2175 | 30 | -.0001 | 0 | PIN THROUGH 2.05 POLY LAYERS |
| 398 | 2172 | 30 | -.0001 | 0 | PIN THROUGH 2.05 COPPER LAYERS |
| 399 | 2174 | 30 | -.0001 | 0 | PIN THROUGH 2.05 COPPER LAYERS |
| 400 | 2176 | 30 | -.0001 | 0 | PIN THROUGH 2.05 COPPER LAYERS |
| 401 | 2181 | 30 | -.0001 | 0 | PIN THROUGH 2.06 POLY LAYERS |
| 402 | 2183 | 30 | -.0001 | 0 | PIN THROUGH 2.06 POLY LAYERS |
| 403 | 2185 | 30 | -.0001 | 0 | PIN THROUGH 2.06 POLY LAYERS |
| 404 | 2182 | 30 | -.0001 | 0 | PIN THROUGH 2.06 COPPER LAYERS |
| 405 | 2184 | 30 | -.0001 | 0 | PIN THROUGH 2.06 COPPER LAYERS |
| 406 | 2186 | 30 | -.0001 | 0 | PIN THROUGH 2.06 COPPER LAYERS |
| 407 | 2191 | 30 | -.0003 | .008 | PIN THROUGH 2.07 POLY LAYERS |
| 408 | 2193 | 30 | -.0003 | 0 | PIN THROUGH 2.07 POLY LAYERS |
| 409 | 2195 | 30 | -.0003 | 0 | PIN THROUGH 2.07 POLY LAYERS |
| 410 | 2192 | 30 | -.0001 | 0 | PIN THROUGH 2.07 COPPER LAYERS |
| 411 | 2194 | 30 | -.0001 | 0 | PIN THROUGH 2.07 COPPER LAYERS |
| 412 | 2196 | 30 | -.0001 | 0 | PIN THROUGH 2.07 COPPER LAYERS |
| 413 | 2201 | 30 | -.0003 | .008 | PIN THROUGH 2.08 POLY LAYERS |
| 414 | 2203 | 30 | -.0003 | 0 | PIN THROUGH 2.08 POLY LAYERS |

CTRL-F1Import ITAS_NC    UDC Allowed                          PgDn PgUp Home End
SHFT-F1Import Column                          Shift-F5Del/Pur
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 415 | 2205 | 30 | -.0003 | 0 | PIN THROUGH 2.08 POLY LAYERS |
| 416 | 2202 | 30 | -.0001 | 0 | PIN THROUGH 2.08 COPPER LAYERS |
| 417 | 2204 | 30 | -.0001 | 0 | PIN THROUGH 2.08 COPPER LAYERS |
| 418 | 2206 | 30 | -.0001 | 0 | PIN THROUGH 2.08 COPPER LAYERS |
| 419 | 2211 | 30 | -.0003 | .003 | PIN THROUGH 2.09 POLY LAYERS |
| 420 | 2213 | 30 | -.0003 | 0 | PIN THROUGH 2.09 POLY LAYERS |
| 421 | 2215 | 30 | -.0003 | 0 | PIN THROUGH 2.09 POLY LAYERS |
| 422 | 2212 | 30 | -.0001 | 0 | PIN THROUGH 2.09 COPPER LAYERS |
| 423 | 2214 | 30 | -.0001 | 0 | PIN THROUGH 2.09 COPPER LAYERS |
| 424 | 2216 | 30 | -.0001 | 0 | PIN THROUGH 2.09 COPPER LAYERS |
| 425 | 2221 | 30 | -.0003 | .006 | PIN THROUGH 2.10 POLY LAYERS |
| 426 | 2223 | 30 | -.0003 | 0 | PIN THROUGH 2.10 POLY LAYERS |
| 427 | 2225 | 30 | -.0003 | 0 | PIN THROUGH 2.10 POLY LAYERS |
| 428 | 2222 | 30 | -.0001 | 0 | PIN THROUGH 2.10 COPPER LAYERS |
| 429 | 2224 | 30 | -.0001 | 0 | PIN THROUGH 2.10 COPPER LAYERS |
| 430 | 2226 | 30 | -.0001 | 0 | PIN THROUGH 2.10 COPPER LAYERS |
| 431 | 2231 | 30 | -.0003 | 0 | PIN THROUGH 2.11 POLY LAYERS |
| 432 | 2233 | 30 | -.0003 | 0 | PIN THROUGH 2.11 POLY LAYERS |

CTRL-F1Import ITAS_NC    UDC Allowed                          PgDn PgUp Home End
SHFT-F1Import Column                          Shift-F5Del/Pur
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 433 | 2235 | 30 | -.0001 | 0 | PIN THROUGH 2.11 POLY LAYERS |
| 434 | 2232 | 30 | -.0001 | 0 | PIN THROUGH 2.11 COPPER LAYERS |
| 435 | 2234 | 30 | -.0001 | 0 | PIN THROUGH 2.11 COPPER LAYERS |
| 436 | 2236 | 30 | -.0001 | 0 | PIN THROUGH 2.11 COPPER LAYERS |
| 437 | 2241 | 30 | -.0003 | 0 | PIN THROUGH 2.12 POLY LAYER |
| 438 | 2243 | 30 | -.0003 | 0 | PIN THROUGH 2.12 POLY LAYER |
| 439 | 2245 | 30 | -.0003 | 0 | PIN THROUGH 2.12 POLY LAYER |
| 440 | 2242 | 30 | -.0001 | 0 | PIN THROUGH 2.12 COPPER LAYERS |
| 441 | 2244 | 30 | -.0001 | 0 | PIN THROUGH 2.12 COPPER LAYERS |
| 442 | 2246 | 30 | -.0001 | 0 | PIN THROUGH 2.12 COPPER LAYERS |
| 443 | 2251 | 30 | -.0001 | .006 | PIN THROUGH 2.13 POLY LAYERS |
| 444 | 2253 | 30 | -.0001 | 0 | PIN THROUGH 2.13 POLY LAYERS |
| 445 | 2255 | 30 | -.0001 | 0 | PIN THROUGH 2.13 POLY LAYERS |
| 446 | 2252 | 30 | -.0001 | 0 | PIN THROUGH 2.13 COPPER LAYERS |
| 447 | 2254 | 30 | -.0001 | 0 | PIN THROUGH 2.13 COPPER LAYERS |
| 448 | 2256 | 30 | -.0001 | 0 | PIN THROUGH 2.13 COPPER LAYERS |
| 449 | 2261 | 30 | -.0001 | .006 | PIN THROUGH 2.14 POLY LAYERS |
| 450 | 2263 | 30 | -.0001 | 0 | PIN THROUGH 2.14 POLY LAYERS |

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CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                    Shift-F5Del/Pur
      FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark Fl0Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 451 | 2265 | 30 | -.0001 | 0 | PIN THROUGH 2.14 POLY LAYERS |
| 452 | 2262 | 30 | -.0001 | 0 | PIN THROUGH 2.14 COPPER LAYERS |
| 453 | 2264 | 30 | -.0001 | 0 | PIN THROUGH 2.14 COPPER LAYERS |
| 454 | 2266 | 30 | -.0001 | 0 | PIN THROUGH 2.14 COPPER LAYERS |
| 455 | 2271 | 30 | -.0001 | .001 | PIN THROUGH 2.15 POLY LAYERS |
| 456 | 2273 | 30 | -.0001 | 0 | PIN THROUGH 2.15 POLY LAYERS |
| 457 | 2275 | 30 | -.0001 | 0 | PIN THROUGH 2.15 POLY LAYERS |
| 458 | 2272 | 30 | -.0001 | 0 | PIN THROUGH 2.15 COPPER LAYERS |
| 459 | 2274 | 30 | -.0001 | 0 | PIN THROUGH 2.15 COPPER LAYERS |
| 460 | 2276 | 30 | -.0001 | 0 | PIN THROUGH 2.15 COPPER LAYERS |
| 461 | 2281 | 30 | -.0001 | .001 | PIN THROUGH 2.16 POLY LAYERS |
| 462 | 2283 | 30 | -.0001 | 0 | PIN THROUGH 2.16 POLY LAYERS |
| 463 | 2285 | 30 | -.0001 | 0 | PIN THROUGH 2.16 POLY LAYERS |
| 464 | 2282 | 30 | -.0001 | 0 | PIN THROUGH 2.16 COPPER LAYERS |
| 465 | 2284 | 30 | -.0001 | 0 | PIN THROUGH 2.16 COPPER LAYERS |
| 466 | 2286 | 30 | -.0001 | 0 | PIN THROUGH 2.16 COPPER LAYERS |
| 467 | 2291 | 30 | -.0001 | 0 | PIN THROUGH 2.17 POLY LAYERS |
| 468 | 2293 | 30 | -.0001 | 0 | PIN THROUGH 2.17 POLY LAYERS |

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CTRL-FlImport ITAS_NC    UDC Allowed                    PgDn PgUp Home End
SHFT-FlImport Column                    Shift-F5Del/Pur
      FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark Fl0Search

| | SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment | |
|---|---|---|---|---|---|---|---|
| ¤ | 469 | 2295 | 30 | -.0001 | 0 | PIN THROUGH 2.17 POLY LAYERS | ¤ |
| ¤ | 470 | 2292 | 30 | -.0001 | 0 | PIN THROUGH 2.17 COPPER LAYERS | ¤ |
| ¤ | 471 | 2294 | 30 | -.0001 | 0 | PIN THROUGH 2.17 COPPER LAYERS | ¤ |
| ¤ | 472 | 2296 | 30 | -.0001 | 0 | PIN THROUGH 2.17 COPPER LAYERS | ¤ |
| ¤ | 473 | 2301 | 30 | -.0001 | 0 | PIN THROUGH 2.18 POLY LAYERS | ¤ |
| ¤ | 474 | 2303 | 30 | -.0001 | 0 | PIN THROUGH 2.18 POLY LAYERS | ¤ |
| ¤ | 475 | 2305 | 30 | -.0001 | 0 | PIN THROUGH 2.18 POLY LAYERS | ¤ |
| ¤ | 476 | 2302 | 30 | -.0001 | 0 | PIN THROUGH 2.18 COPPER LAYERS | ¤ |
| ¤ | 477 | 2304 | 30 | -.0001 | 0 | PIN THROUGH 2.18 COPPER LAYERS | ¤ |
| ¤ | 478 | 2306 | 30 | -.0001 | 0 | PIN THROUGH 2.18 COPPER LAYERS | ¤ |
| ¤ | 479 | 3011 | 30 | -.0011 | 0 | PIN THROUGH 4.00 POLY LAYERS | ¤ |
| ¤ | 480 | 3013 | 30 | -.0011 | 0 | PIN THROUGH 4.00 POLY LAYERS | ¤ |
| ¤ | 481 | 3015 | 30 | -.0011 | 0 | PIN THROUGH 4.00 POLY LAYERS | ¤ |
| ¤ | 482 | 3012 | 30 | -.0001 | 0 | PIN THROUGH 4.OO COPPER LAYERS | ¤ |
| ¤ | 483 | 3014 | 30 | -.0001 | 0 | PIN THROUGH 4.OO COPPER LAYERS | ¤ |
| ¤ | 484 | 3016 | 30 | -.0001 | 0 | PIN THROUGH 4.OO COPPER LAYERS | ¤ |
| ¤ | 485 | 3021 | 30 | -.0006 | .113 | PIN THROUGH 5.01 POLY LAYERS | ¤ |
| ¤ | 486 | 3023 | 30 | -.0006 | 0 | PIN THROUGH 5.01 POLY LAYERS | ¤ |

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CTRL-FlImport ITAS_NC    UDC Allowed                      PgDn PgUp Home End
SHFT-FlImport Column                        Shift-F5Del/Pur
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark Fl0Search

| | SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment | |
|---|---|---|---|---|---|---|---|
| ¤ | 487 | 3025 | 30 | -.0006 | 0 | PIN THROUGH 5.01 POLY LAYERS | ¤ |
| ¤ | 488 | 3022 | 30 | -.0001 | 0 | PIN THROUGH 5.01 COPPER LAYERS | ¤ |
| ¤ | 489 | 3024 | 30 | -.0001 | 0 | PIN THROUGH 5.01 COPPER LAYERS | ¤ |
| ¤ | 490 | 3026 | 30 | -.0001 | 0 | PIN THROUGH 5.01 COPPER LAYERS | ¤ |
| ¤ | 491 | 3031 | 30 | -.0006 | .036 | PIN THROUGH 5.02 POLY LAYERS | ¤ |
| ¤ | 492 | 3033 | 30 | -.0006 | 0 | PIN THROUGH 5.02 POLY LAYERS | ¤ |
| ¤ | 493 | 3035 | 30 | -.0006 | 0 | PIN THROUGH 5.02 POLY LAYERS | ¤ |
| ¤ | 494 | 3032 | 30 | -.0001 | 0 | PIN THROUGH 5.02 COPPER LAYERS | ¤ |
| ¤ | 495 | 3034 | 30 | -.0001 | 0 | PIN THROUGH 5.02 COPPER LAYERS | ¤ |
| ¤ | 496 | 3036 | 30 | -.0001 | 0 | PIN THROUGH 5.02 COPPER LAYERS | ¤ |
| ¤ | 497 | 3041 | 30 | -.0002 | 0 | PIN THROUGH 5.03 POLY LAYERS | ¤ |
| ¤ | 498 | 3043 | 30 | -.0002 | 0 | PIN THROUGH 5.03 POLY LAYERS | ¤ |
| ¤ | 499 | 3045 | 30 | -.0002 | 0 | PIN THROUGH 5.03 POLY LAYERS | ¤ |
| ¤ | 500 | 3042 | 30 | -.0001 | 0 | PIN THROUGH 5.03 COPPER LAYERS | ¤ |
| ¤ | 501 | 3044 | 30 | -.0001 | 0 | PIN THROUGH 5.03 COPPER LAYERS | ¤ |
| ¤ | 502 | 3046 | 30 | -.0001 | 0 | PIN THROUGH 5.03 COPPER LAYERS | ¤ |
| ¤ | 503 | 3051 | 30 | -.0005 | .05 | PIN THROUGH 5.04 POLY LAYERS | ¤ |
| ¤ | 504 | 3053 | 30 | -.0005 | 0 | PIN THROUGH 5.04 POLY LAYERS | ¤ |

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CTRL-FlImport ITAS_NC    UDC Allowed                      PgDn PgUp Home End
SHFT-FlImport Column                        Shift-F5Del/Pur
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark Fl0Search

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 505 | 3055 | 30 | -.0005 | 0 | PIN THROUGH 5.04 POLY LAYERS |
| 506 | 3052 | 30 | -.0001 | 0 | PIN THROUGH 5.04 COPPER LAYERS |
| 507 | 3054 | 30 | -.0001 | 0 | PIN THROUGH 5.04 COPPER LAYERS |
| 508 | 3056 | 30 | -.0001 | 0 | PIN THROUGH 5.04 COPPER LAYERS |
| 509 | 3061 | 30 | -.0006 | .025 | PIN THROUGH 5.05 POLY LAYERS |
| 510 | 3063 | 30 | -.0006 | 0 | PIN THROUGH 5.05 POLY LAYERS |
| 511 | 3065 | 30 | -.0006 | 0 | PIN THROUGH 5.05 POLY LAYERS |
| 512 | 3062 | 30 | -.0006 | 0 | PIN THROUGH 5.05 COPPER LAYERS |
| 513 | 3064 | 30 | -.0001 | 0 | PIN THROUGH 5.05 COPPER LAYERS |
| 514 | 3066 | 30 | -.0001 | 0 | PIN THROUGH 5.05 COPPER LAYERS |
| 515 | 3091 | 30 | -.0001 | .1 | PIN THROUGH 6.03 POLY LAYERS |
| 516 | 3093 | 30 | -.0001 | 0 | PIN THROUGH 6.03 POLY LAYERS |
| 517 | 3095 | 30 | -.0001 | 0 | PIN THROUGH 6.03 POLY LAYERS |
| 518 | 3092 | 30 | -.0001 | 0 | PIN THROUGH 6.03 COPPER LAYERS |
| 519 | 3094 | 30 | -.0001 | 0 | PIN THROUGH 6.03 COPPER LAYERS |
| 520 | 3096 | 30 | -.0001 | 0 | PIN THROUGH 6.03 COPPER LAYERS |
| 521 | 3101 | 30 | -.0001 | .125 | PIN THROUGH 6.04 POLY LAYERS |
| 522 | 3103 | 30 | -.0001 | 0 | PIN THROUGH 6.04 POLY LAYERS |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 523 | 3105 | 30 | -.0001 | 0 | PIN THROUGH 6.04 POLY LAYERS |
| 524 | 3102 | 30 | -.0001 | 0 | PIN THROUGH 6.04 COPPER LAYERS |
| 525 | 3104 | 30 | -.0001 | 0 | PIN THROUGH 6.04 COPPER LAYERS |
| 526 | 3106 | 30 | -.0001 | 0 | PIN THROUGH 6.04 COPPER LAYERS |
| 527 | 3111 | 30 | -.0001 | .025 | PIN THROUGH 6.05 POLY LAYERS |
| 528 | 3113 | 30 | -.0001 | 0. | PIN THROUGH 6.05 POLY LAYERS |
| 529 | 3115 | 30 | -.0001 | 0 | PIN THROUGH 6.05 POLY LAYERS |
| 530 | 3112 | 30 | -.0001 | 0 | PIN THROUGH 6.05 COPPER LAYER |
| 531 | 3114 | 30 | -.0001 | 0 | PIN THROUGH 6.05 COPPER LAYER |
| 532 | 3116 | 30 | -.0001 | 0 | PIN THROUGH 6.05 COPPER LAYER |
| 533 | 3121 | 30 | -.0003 | .025 | PIN THROUGH 6.06 POLY LAYERS |
| 534 | 3123 | 30 | -.0003 | 0 | PIN THROUGH 6.06 POLY LAYERS |
| 535 | 3125 | 30 | -.0003 | 0 | PIN THROUGH 6.06 POLY LAYERS |
| 536 | 3122 | 30 | -.0001 | 0 | PIN THROUGH 6.06 COPPER LAYERS |
| 537 | 3124 | 30 | -.0001 | 0 | PIN THROUGH 6.06 COPPER LAYERS |
| 538 | 3126 | 30 | -.0001 | 0 | PIN THROUGH 6.06 COPPER LAYERS |
| 539 | 3141 | 30 | -.0002 | .375 | PIN THROUGH 7.01 POLY LAYERS |
| 540 | 3143 | 30 | -.0002 | 0 | PIN THROUGH 7.01 POLY LAYERS |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 541 | 3145 | 30 | -.0002 | 0 | PIN THROUGH 7.01 POLY LAYERS |
| 542 | 3142 | 30 | -.0001 | 0 | PIN THROUGH 7.01 COPPER LAYER |
| 543 | 3144 | 30 | -.0001 | 0 | PIN THROUGH 7.01 COPPER LAYER |
| 544 | 3146 | 30 | -.0001 | 0 | PIN THROUGH 7.01 COPPER LAYER |
| 545 | 3151 | 30 | -.0017 | .105 | PIN THROUGH 7.02 POLY LAYERS |
| 546 | 3153 | 30 | -.0017 | 0 | PIN THROUGH 7.02 POLY LAYERS |
| 547 | 3155 | 30 | -.0017 | 0 | PIN THROUGH 7.02 POLY LAYERS |
| 548 | 3152 | 30 | -.0001 | 0 | PIN THROUGH 7.02 COPPER LAYERS |
| 549 | 3154 | 30 | -.0001 | 0 | PIN THROUGH 7.02 COPPER LAYERS |
| 550 | 3156 | 30 | -.0001 | 0 | PIN THROUGH 7.02 COPPER LAYERS |
| 551 | 3161 | 30 | -.0020 | .150 | PIN THROUGH 7.03 POLY LAYERS |
| 552 | 3163 | 30 | -.0020 | 0 | PIN THROUGH 7.03 POLY LAYERS |
| 553 | 3165 | 30 | -.0020 | 0 | PIN THROUGH 7.03 POLY LAYERS |
| 554 | 3162 | 30 | -.0001 | 0 | PIN THROUGH 7.03 COPPER LAYERS |
| 555 | 3164 | 30 | -.0001 | 0 | PIN THROUGH 7.03 COPPER LAYERS |
| 556 | 3166 | 30 | -.0001 | 0 | PIN THROUGH 7.03 COPPER LAYERS |
| 557 | 3171 | 30 | -.0004 | 0 | PIN THROUGH 8.00 POLY LAYERS |
| 558 | 3173 | 30 | -.0004 | 0 | PIN THROUGH 8.00 POLY LAYERS |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 559 | 3175 | 30 | -.0004 | 0 | PIN THROUGH 8.00 POLY LAYERS |
| 560 | 3172 | 30 | -.0001 | 0 | PIN THROUGH 8.00 COPPER LAYERS |
| 561 | 3174 | 30 | -.0001 | 0 | PIN THROUGH 8.00 COPPER LAYERS |
| 562 | 3176 | 30 | -.0001 | 0 | PIN THROUGH 8.00 COPPER LAYERS |
| 563 | 2056 | 30 | -.0001 | 0 | PIN THROUGH 3.05 COPPER LAYER |
| 564 | 2124 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYER |
| 565 | 2126 | 30 | -.0001 | 0 | PIN THROUGH 3.12 COPPER LAYER |

# APPENDIX L. NODE TO NODE CONDUCTANCE CALCULATIONS

| HOUSING TO HOUSING NODES | | | | | |
|---|---|---|---|---|---|
| From | To | Area | Length | k | Conductance |
| 901 | 905 | 0.3138 | 5.175 | 4.31 | 0.261348406 |
| 901 | 906 | 1.88 | 5.2845 | 4.31 | 1.53331441 |
| 901 | 911 | 0.3138 | 4.925 | 4.31 | 0.274614822 |
| 901 | 912 | 1.6 | 5.0845 | 4.31 | 1.356278887 |
| 902 | 903 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 902 | 906 | 0.47 | 4.7845 | 4.31 | 0.423388024 |
| 902 | 907 | 0.3138 | 4.925 | 4.31 | 0.274614822 |
| 902 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 903 | 904 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 903 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 903 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 904 | 905 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 904 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 904 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 905 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 905 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 907 | 906 | 4.925 | 1.6 | 4.31 | 13.26671875 |
| 907 | 908 | 0.3138 | 4.925 | 4.31 | 0.274614822 |
| 907 | 912 | 4.925 | 1.6 | 4.31 | 13.26671875 |
| 908 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 908 | 909 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 908 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 909 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 909 | 910 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 909 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 910 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 910 | 911 | 0.3138 | 2.25 | 4.31 | 0.601101333 |
| 910 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 911 | 906 | 0.45 | 4.5845 | 4.31 | 0.423055949 |
| 911 | 912 | 0.45 | 4.5845 | 4.31 | 0.423055949 |

| | | PCB BOARD TO RAIL CONDUCTANCES | | | | |
|---|---|---|---|---|---|---|
| | | FROM | TO | AREA | LENGTH | k | Conductance |
| BOTTOM RAIL TO | | 921 | 901 | 0.0625 | 4.6 | 4.31 | 0.058559783 |
| EPS HOUSING (+Y) | | 921 | 907 | 0.0625 | 4.6 | 4.31 | 0.058559783 |
| | | 921 | 902 | 0.587 | 0.225 | 4.31 | 11.24431111 |
| | | 921 | 903 | 0.587 | 0.225 | 4.31 | 11.24431111 |
| | | 921 | 904 | 0.587 | 0.225 | 4.31 | 11.24431111 |
| | | 921 | 905 | 0.587 | 0.225 | 4.31 | 11.24431111 |
| | | 921 | 906 | 2.25 | 2.25 | 4.31 | 4.31 |
| MIDDLE RAIL TO | | 922 | 901 | 0.09375 | 4.6 | 4.31 | 0.087839674 |
| EPS HOUSING (+Y) | | 922 | 907 | 0.09375 | 4.6 | 4.31 | 0.087839674 |
| | | 922 | 902 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 922 | 903 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 922 | 904 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 922 | 905 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| TOP RAIL TO | | 923 | 901 | 0.04975 | 4.6 | 4.31 | 0.046613587 |
| EPS HOUSING (+Y) | | 923 | 907 | 0.04975 | 4.6 | 4.31 | 0.046613587 |
| | | 923 | 902 | 0.4279 | 0.225 | 4.31 | 8.196662222 |
| | | 923 | 903 | 0.4677 | 0.225 | 4.31 | 8.959053333 |
| | | 923 | 904 | 0.4677 | 0.225 | 4.31 | 8.959053333 |
| | | 923 | 905 | 0.4279 | 0.225 | 4.31 | 8.196662222 |
| | | 923 | 906 | 1.791 | 2.25 | 4.31 | 3.43076 |
| BOTTOM RAIL TO | | 924 | 901 | 0.0625 | 4.6 | 4.31 | 0.058559783 |
| EPS HOUSING (-Y) | | 924 | 907 | 0.0625 | 4.6 | 4.31 | 0.058559783 |
| | | 924 | 908 | 0.5875 | 0.225 | 4.31 | 11.25388889 |
| | | 924 | 909 | 0.5875 | 0.225 | 4.31 | 11.25388889 |
| | | 924 | 910 | 0.587 | 0.225 | 4.31 | 11.24431111 |
| | | 924 | 911 | 0.5875 | 0.225 | 4.31 | 11.25388889 |
| | | 924 | 912 | 2.25 | 2.25 | 4.31 | 4.31 |
| MIDDLE RAIL TO | | 925 | 901 | 0.09375 | 4.6 | 4.31 | 0.087839674 |
| EPS HOUSING (-Y) | | 925 | 907 | 0.09375 | 4.6 | 4.31 | 0.087839674 |
| | | 925 | 908 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 925 | 909 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 925 | 910 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| | | 925 | 911 | 0.881 | 0.225 | 4.31 | 16.87604444 |
| TOP RAIL TO | | 926 | 901 | 0.04975 | 4.6 | 4.31 | 0.046613587 |
| EPS HOUSING (-Y) | | 926 | 907 | 0.04975 | 4.6 | 4.31 | 0.046613587 |
| | | 926 | 908 | 0.4279 | 0.225 | 4.31 | 8.196662222 |
| | | 926 | 909 | 0.4677 | 0.225 | 4.31 | 8.959053333 |
| | | 926 | 910 | 0.4677 | 0.225 | 4.31 | 8.959053333 |
| | | 926 | 911 | 0.4279 | 0.225 | 4.31 | 8.196662222 |
| | | 926 | 912 | 1.791 | 2.25 | 4.31 | 3.43076 |

| | FROM | TO | A1,2 | L1 | L2 | k-Cu/kpol | k-Al | hc' | hc | K1 | K2 | K0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| BOTTOM | 1601 | 924 | 0.25 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 0.945 | 3600.746 | 8.62 | 0.851435 |
| PCB | 1602 | 924 | 0.39 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 1.4742 | 5617.164 | 13.4472 | 1.328238 |
| THRMAL | 1603 | 924 | 0.281 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 1.06218 | 4047.239 | 9.68888 | 0.957013 |
| LAYER | 1604 | 924 | 0.328 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 1.23984 | 4724.179 | 11.30944 | 1.117082 |
| TO | 1605 | 924 | 0.125 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 0.4725 | 1800.373 | 4.31 | 0.425717 |
| BOTTOM | 1606 | 924 | 0.625 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 2.3625 | 9001.866 | 21.55 | 2.128587 |
| RAIL | 1617 | 924 | 0.25 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 0.945 | 3600.746 | 8.62 | 0.851435 |
| | 1601 | 921 | 0.25 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 0.945 | 3600.746 | 8.62 | 0.851435 |
| | 1614 | 921 | 0.39 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 1.4742 | 5617.164 | 13.4472 | 1.328238 |
| | 1615 | 921 | 0.609 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 2.30202 | 8771.418 | 20.99832 | 2.074095 |
| | 1616 | 921 | 0.75 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 2.835 | 10802.24 | 25.86 | 2.554304 |
| | 1617 | 921 | 0.25 | 0.00067 | 0.125 | 9.65 | 4.31 | 3.78 | 0.945 | 3600.746 | 8.62 | 0.851435 |
| BOTTOM | 1101 | 925 | 0.25 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.0605 | 5.170631 | 5.746667 | 0.059184 |
| PCB POLY | 1102 | 925 | 0.39 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.09438 | 8.066184 | 8.9648 | 0.092328 |
| LAYER | 1103 | 925 | 0.281 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.068002 | 5.811789 | 6.459253 | 0.066523 |
| TO | 1104 | 925 | 0.328 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.079376 | 6.783868 | 7.539627 | 0.07765 |
| MIDDLE | 1105 | 925 | 0.125 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.03025 | 2.585315 | 2.873333 | 0.029592 |
| RAIL | 1106 | 925 | 0.625 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.15125 | 12.92658 | 14.36667 | 0.147961 |
| | 1117 | 925 | 0.25 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.0605 | 5.170631 | 5.746667 | 0.059184 |
| | 1101 | 922 | 0.25 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.0605 | 5.170631 | 5.746667 | 0.059184 |
| | 1114 | 922 | 0.39 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.09438 | 8.066184 | 8.9648 | 0.092328 |
| | 1115 | 922 | 0.609 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.147378 | 12.59566 | 13.99888 | 0.144173 |
| | 1116 | 922 | 0.75 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.1815 | 15.51189 | 17.24 | 0.177553 |
| | 1117 | 922 | 0.25 | 0.00967 | 0.1875 | 0.2 | 4.31 | 0.242 | 0.0605 | 5.170631 | 5.746667 | 0.059184 |
| TOP PCB | 601 | 925 | 0.3438 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.299564 | 4951.746 | 7.902816 | 1.115788 |
| THERMAL | 602 | 925 | 0.4688 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.772064 | 6752.119 | 10.77615 | 1.521469 |
| LAYER | 603 | 925 | 0.125 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 0.4725 | 1800.373 | 2.873333 | 0.405682 |
| TO | 604 | 925 | 0.5 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.89 | 7201.493 | 11.49333 | 1.622728 |
| MIDDLE | 605 | 925 | 0.125 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 0.4725 | 1800.373 | 2.873333 | 0.405682 |
| RAIL | 606 | 925 | 0.6875 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 2.59875 | 9902.052 | 15.80333 | 2.231251 |
| | 625 | 922 | 0.6875 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 2.59875 | 9902.052 | 15.80333 | 2.231251 |
| | 626 | 922 | 0.3438 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.299564 | 4951.746 | 7.902816 | 1.115788 |
| | 627 | 922 | 0.3438 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.299564 | 4951.746 | 7.902816 | 1.115788 |

101

| | ID | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | 628 | 922 | 0.3438 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.299564 | 4951.746 | 7.902816 | 1.115788 |
| | 629 | 922 | 0.3438 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 1.299564 | 4951.746 | 7.902816 | 1.115788 |
| | 630 | 922 | 0.6875 | 0.00067 | 0.1875 | 9.65 | 4.31 | 3.78 | 2.59875 | 9902.052 | 15.80333 | 2.231251 |
| TOP PCB | 101 | 926 | 0.3438 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.0832 | 7.110651 | 14.89224 | 0.081786 |
| THERMAL | 102 | 926 | 0.4688 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.11345 | 9.695967 | 20.30681 | 0.111522 |
| LAYER | 103 | 926 | 0.125 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.03025 | 2.585315 | 5.414573 | 0.029736 |
| TO | 104 | 926 | 0.5 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.121 | 10.34126 | 21.65829 | 0.118944 |
| MIDDLE | 105 | 926 | 0.125 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.03025 | 2.585315 | 5.414573 | 0.029736 |
| RAIL | 106 | 926 | 0.6875 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.166375 | 14.21923 | 29.78015 | 0.163548 |
| | 125 | 923 | 0.6875 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.166375 | 14.21923 | 29.78015 | 0.163548 |
| | 126 | 923 | 0.3438 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.0832 | 7.110651 | 14.89224 | 0.081786 |
| | 127 | 923 | 0.3438 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.0832 | 7.110651 | 14.89224 | 0.081786 |
| | 128 | 923 | 0.3438 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.0832 | 7.110651 | 14.89224 | 0.081786 |
| | 129 | 923 | 0.3438 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.0832 | 7.110651 | 14.89224 | 0.081786 |
| | 130 | 923 | 0.6875 | 0.00967 | 0.0995 | 0.2 | 4.31 | 0.242 | 0.166375 | 14.21923 | 29.78015 | 0.163548 |

TOP PCB THERMAL LAYER NODE TO NODE

APPLIES TO LAYERS
4XX AND 2XX

| FROM | TO | AREA | LENGTH | k | Conductance |
|---|---|---|---|---|---|
| 601 | 602 | 0.003183 | 1.625 | 9.65 | 0.0189902123 |
| 601 | 607 | 0.00184 | 2.625 | 9.65 | 0.00676419 |
| 602 | 603 | 0.003183 | 1.1875 | 9.65 | 0.025866063 |
| 602 | 608 | 0.02513 | 2.625 | 9.65 | 0.092382667 |
| 603 | 604 | 0.003138 | 1.25 | 9.65 | 0.02422536 |
| 603 | 609 | 0.0007 | 2.625 | 9.65 | 0.0025733333 |
| 604 | 605 | 0.003183 | 1.25 | 9.65 | 0.02457276 |
| 604 | 610 | 0.00268 | 2.625 | 9.65 | 0.00985219 |
| 605 | 606 | 0.003138 | 2 | 9.65 | 0.018634892 |
| 605 | 611 | 0.0007 | 2.625 | 9.65 | 0.0025733333 |
| 606 | 612 | 0.00369 | 2.625 | 9.65 | 0.013565143 |
| 607 | 608 | 0.00385 | 1.625 | 9.65 | 0.022863077 |
| 607 | 613 | 0.00184 | 1.84375 | 9.65 | 0.0096303073 |
| 608 | 609 | 0.00385 | 1.875 | 9.65 | 0.019814667 |
| 608 | 613 | 0.0005 | 1.84375 | 9.65 | 0.0026616949 |
| 608 | 614 | 0.00184 | 1.84375 | 9.65 | 0.009630373 |
| 608 | 615 | 0.00775 | 1.84375 | 9.65 | 0.040562712 |
| 609 | 610 | 0.00385 | 1.25 | 9.65 | 0.029722 |
| 609 | 615 | 0.0007 | 1.84375 | 9.65 | 0.003663729 |
| 610 | 611 | 0.00385 | 1.25 | 9.65 | 0.029722 |
| 610 | 615 | 0.001 | 1.84375 | 9.65 | 0.005233898 |
| 610 | 616 | 0.00168 | 1.84375 | 9.65 | 0.008792949 |
| 611 | 612 | 0.00385 | 1.625 | 9.65 | 0.022863077 |
| 611 | 616 | 0.00168 | 1.84375 | 9.65 | 0.008792949 |
| 611 | 617 | 0.0005 | 1.84375 | 9.65 | 0.002616949 |
| 612 | 617 | 0.00134 | 1.84375 | 9.65 | 0.007013424 |
| 612 | 618 | 0.00235 | 1.84375 | 9.65 | 0.012299661 |
| 613 | 614 | 0.00116 | 1.5625 | 9.65 | 0.00716416 |
| 613 | 619 | 0.00235 | 0.9375 | 9.65 | 0.024189333 |
| 614 | 615 | 0.00116 | 1.375 | 9.65 | 0.008141091 |
| 614 | 620 | 0.00184 | 0.9375 | 9.65 | 0.018939733 |
| 615 | 616 | 0.00116 | 1.375 | 9.65 | 0.008141091 |

| | | | | | |
|---|---|---|---|---|---|
| 615 | 621 | 0.00178 | 0.9375 | 9.65 | 0.018322133 |
| 616 | 617 | 0.00116 | 1.375 | 9.65 | 0.008141091 |
| 616 | 622 | 0.00184 | 0.9375 | 9.65 | 0.018939733 |
| 617 | 618 | 0.00116 | 2 | 9.65 | 0.00716416 |
| 617 | 623 | 0.00184 | 0.9375 | 9.65 | 0.018939733 |
| 618 | 624 | 0.001 | 0.9375 | 9.65 | 0.010293333 |
| 619 | 620 | 0.00142 | 1.5625 | 9.65 | 0.00876992 |
| 619 | 625 | 0.00235 | 0.96875 | 9.65 | 0.023409032 |
| 620 | 621 | 0.00142 | 1.375 | 9.65 | 0.009965818 |
| 620 | 626 | 0.00184 | 0.96875 | 9.65 | 0.018328774 |
| 621 | 622 | 0.00142 | 1.375 | 9.65 | 0.009965818 |
| 621 | 627 | 0.00178 | 0.96875 | 9.65 | 0.017731097 |
| 622 | 623 | 0.00142 | 0.96875 | 9.65 | 0.014145032 |
| 622 | 628 | 0.00184 | 1.375 | 9.65 | 0.012913455 |
| 623 | 624 | 0.00142 | 1.5625 | 9.65 | 0.00876992 |
| 623 | 629 | 0.00184 | 0.96875 | 9.65 | 0.018328774 |
| 624 | 630 | 0.001 | 0.96875 | 9.65 | 0.00996129 |
| 625 | 626 | 0.00173 | 1.5625 | 9.65 | 0.01068448 |
| 626 | 627 | 0.00173 | 1.375 | 9.65 | 0.012141455 |
| 627 | 628 | 0.00173 | 1.375 | 9.65 | 0.012141455 |
| 628 | 629 | 0.00173 | 1.375 | 9.65 | 0.012141455 |
| 629 | 630 | 0.00173 | 1.5625 | 9.65 | 0.01068448 |

| APPLIES TO LAYERS | FROM | TO | AREA | LENGTH | k | CONDUCTANCE |
|---|---|---|---|---|---|---|
| | | | | TOP PCB POLYIMIDE LAYER NODE TO NODE | | |
| 3XX AND 1XX | 501 | 502 | 0.04591 | 1.625 | 0.2 | 0.005650462 |
| | 501 | 507 | 0.02658 | 2.625 | 0.2 | 0.002025143 |
| | 502 | 503 | 0.04591 | 1.1874 | 0.2 | 0.007732862 |
| | 502 | 508 | 0.03624 | 2.625 | 0.2 | 0.002761143 |
| | 503 | 504 | 0.04591 | 1.25 | 0.2 | 0.0073456 |
| | 503 | 509 | 0.09665 | 2.625 | 0.2 | 0.00736381 |
| | 504 | 505 | 0.04591 | 1.25 | 0.2 | 0.0073456 |
| | 504 | 510 | 0.03866 | 2.625 | 0.2 | 0.002945524 |
| | 505 | 506 | 0.04591 | 1.625 | 0.2 | 0.005650462 |
| | 505 | 511 | 0.09665 | 2.625 | 0.2 | 0.00736381 |
| | 506 | 512 | 0.05316 | 2.625 | 0.2 | 0.004050286 |
| | 507 | 508 | 0.05557 | 1.625 | 0.2 | 0.006839385 |
| | 507 | 513 | 0.02658 | 1.184375 | 0.2 | 0.004488443 |
| | 508 | 509 | 0.05557 | 1.1875 | 0.2 | 0.009359158 |
| | 508 | 513 | 0.00725 | 1.184375 | 0.2 | 0.001224274 |
| | 508 | 514 | 0.02658 | 1.184375 | 0.2 | 0.004488443 |
| | 508 | 515 | 0.00242 | 1.184375 | 0.2 | 0.000408654 |
| | 509 | 510 | 0.05557 | 1.25 | 0.2 | 0.0088912 |
| | 509 | 515 | 0.09665 | 1.184375 | 0.2 | 0.016320844 |
| | 510 | 511 | 0.05557 | 1.25 | 0.2 | 0.0088912 |
| | 510 | 515 | 0.0145 | 1.184375 | 0.2 | 0.002448549 |
| | 510 | 516 | 0.024163 | 1.184375 | 0.2 | 0.004080296 |
| | 511 | 512 | 0.05557 | 2 | 0.2 | 0.006839385 |
| | 511 | 516 | 0.02416 | 1.184375 | 0.2 | 0.004079789 |
| | 511 | 517 | 0.007249 | 1.184375 | 0.2 | 0.001224106 |
| | 512 | 517 | 0.01933 | 1.184375 | 0.2 | 0.003264169 |
| | 512 | 518 | 0.033828 | 1.184375 | 0.2 | 0.00571238 |
| | 513 | 514 | 0.01576 | 1.562 | 0.2 | 0.002017926 |
| | 513 | 519 | 0.03383 | 0.9375 | 0.2 | 0.007217067 |
| | 514 | 515 | 0.015706 | 1.375 | 0.2 | 0.002284509 |
| | 514 | 520 | 0.02658 | 0.9375 | 0.2 | 0.0056704 |
| | 515 | 516 | 0.015706 | 1.375 | 0.2 | 0.002284509 |
| | 515 | 521 | 0.02658 | 0.9375 | 0.2 | 0.0056704 |

| | | | | | |
|---|---|---|---|---|---|
| 516 | 517 | 0.015706 | 1.375 | 0.2 | 0.002284509 |
| 516 | 522 | 0.02658 | 0.9375 | 0.2 | 0.0056704 |
| 517 | 518 | 0.015706 | 1.5625 | 0.2 | 0.002010368 |
| 517 | 523 | 0.02658 | 0.9375 | 0.2 | 0.0056704 |
| 518 | 524 | 0.03383 | 0.9375 | 0.2 | 0.007217067 |
| 519 | 520 | 0.02054 | 1.5625 | 0.2 | 0.00262912 |
| 519 | 525 | 0.03383 | 0.96875 | 0.2 | 0.006984258 |
| 520 | 521 | 0.02054 | 1.375 | 0.2 | 0.002987636 |
| 520 | 526 | 0.02658 | 0.96875 | 0.2 | 0.005487484 |
| 521 | 522 | 0.02054 | 1.375 | 0.2 | 0.002987636 |
| 521 | 527 | 0.02658 | 0.96875 | 0.2 | 0.005487484 |
| 522 | 523 | 0.02054 | 1.375 | 0.2 | 0.002987636 |
| 522 | 528 | 0.02658 | 0.96875 | 0.2 | 0.005487484 |
| 523 | 524 | 0.02054 | 1.5625 | 0.2 | 0.00262912 |
| 523 | 529 | 0.02658 | 0.96875 | 0.2 | 0.005487484 |
| 524 | 530 | 0.03383 | 0.96875 | 0.2 | 0.006984258 |
| 525 | 526 | 0.01691 | 1.5625 | 0.2 | 0.00216448 |
| 526 | 527 | 0.01691 | 1.375 | 0.2 | 0.002459636 |
| 527 | 528 | 0.01691 | 1.375 | 0.2 | 0.002459636 |
| 528 | 529 | 0.01691 | 1.375 | 0.2 | 0.002459636 |
| 529 | 530 | 0.01691 | 1.5625 | 0.2 | 0.00216448 |

TOP PCB LAYER CONDUCTANCES

| APPLIES TO | FROM | TO | A1.2 | L1 | L2 | k-Cu | k-poly | hc' | hc | | K1 | K2 | K0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ALL TOP PCB LAYERS | 601 | 501 | 3.2656 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.63124 | 974.806 | 67.54085 | 0.624995 |
| | 602 | 502 | 4.4531 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.860784 | 1329.284 | 92.10134 | 0.852267 |
| | 603 | 503 | 1.1875 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.229544 | 354.4776 | 24.5605 | 0.227272 |
| | 604 | 504 | 4.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.918175 | 1417.91 | 98.24199 | 0.90909 |
| | 605 | 505 | 4.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.918175 | 1417.91 | 98.24199 | 0.90909 |
| | 606 | 506 | 6.531 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.262442 | 1949.552 | 135.0776 | 1.249951 |
| | 607 | 507 | 3.953 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.764115 | 1180 | 81.75801 | 0.756554 |
| | 608 | 508 | 5.391 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.04208 | 1609.254 | 111.4995 | 1.031769 |
| | 609 | 509 | 1.43375 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.277869 | 429.1045 | 29.73113 | 0.275119 |
| | 610 | 510 | 5.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.111475 | 1716.418 | 118.9245 | 1.100477 |
| | 611 | 511 | 5.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.111475 | 1716.418 | 118.9245 | 1.100477 |
| | 612 | 512 | 7.906 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.52823 | 2360 | 163.516 | 1.513108 |
| | 613 | 513 | 1.421 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.274679 | 424.1791 | 29.38987 | 0.271961 |
| | 614 | 514 | 1.117 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.215916 | 333.4328 | 23.10238 | 0.21378 |
| | 615 | 515 | 1.117 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.215916 | 333.4328 | 23.10238 | 0.21378 |
| | 616 | 516 | 1.117 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.215916 | 333.4328 | 23.10238 | 0.21378 |
| | 617 | 517 | 1.117 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.215916 | 333.4328 | 23.10238 | 0.21378 |
| | 618 | 518 | 1.421 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.274679 | 424.1791 | 29.38987 | 0.271961 |
| | 619 | 519 | 1.859 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.359345 | 554.9254 | 38.44881 | 0.355789 |
| | 620 | 520 | 1.461 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.282411 | 436.1194 | 30.21717 | 0.279617 |
| | 621 | 521 | 1.461 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.282411 | 436.1194 | 30.21717 | 0.279617 |
| | 622 | 522 | 1.461 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.282411 | 436.1194 | 30.21717 | 0.279617 |
| | 623 | 523 | 1.461 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.282411 | 436.1194 | 30.21717 | 0.279617 |
| | 624 | 524 | 1.859 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.359345 | 554.9254 | 38.44881 | 0.355789 |
| | 625 | 525 | 1.531 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.295942 | 457.0149 | 31.66494 | 0.293014 |
| | 626 | 526 | 1.203 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.23254 | 359.1045 | 24.88108 | 0.230239 |
| | 627 | 527 | 1.203 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.23254 | 359.1045 | 24.88108 | 0.230239 |
| | 628 | 528 | 1.203 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.23254 | 359.1045 | 24.88108 | 0.230239 |
| | 629 | 529 | 1.203 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.23254 | 359.1045 | 24.88108 | 0.230239 |
| | 630 | 530 | 1.531 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.295942 | 457.0149 | 31.66494 | 0.293014 |

BOTTOM PCB THERMAL LAYER NODE TO NODE

| | FROM | TO | AREA | LENGTH | k | CONDUCTANCE |
|---|---|---|---|---|---|---|
| APPLIES TO LAYERS | 1601 | 1602 | 0.00402 | 1.281 | 0.2 | 0.000627635 |
| 4XX AND 2XX | 1601 | 1607 | 0.00201 | 1.281 | 0.2 | 0.000313817 |
| | 1601 | 1614 | 0.00469 | 1.281 | 0.2 | 0.00073224 |
| | 1602 | 1603 | 0.00402 | 1.3438 | 0.2 | 0.000598303 |
| | 1602 | 1607 | 0.00294 | 2.25 | 0.2 | 0.000261333 |
| | 1603 | 1604 | 0.00402 | 1.2188 | 0.2 | 0.000659665 |
| | 1603 | 1608 | 0.00151 | 2.25 | 0.2 | 0.000134222 |
| | 1604 | 1605 | 0.00402 | 0.906 | 0.2 | 0.000887417 |
| | 1604 | 1609 | 0.00059 | 2.25 | 0.2 | 5.24444E-05 |
| | 1604 | 1610 | 0.0005 | 2.25 | 0.2 | 4.44444E-05 |
| | 1604 | 1611 | 0.00067 | 2.25 | 0.2 | 5.95556E-05 |
| | 1605 | 1606 | 0.00402 | 1.5 | 0.2 | 0.000536 |
| | 1605 | 1612 | 0.00059 | 2.25 | 0.2 | 5.24444E-05 |
| | 1606 | 1617 | 0.00402 | 1.75 | 0.2 | 0.000459429 |
| | 1606 | 1613 | 0.00335 | 2.25 | 0.2 | 0.000297778 |
| | 1607 | 1608 | 0.00201 | 1.3438 | 0.2 | 0.000299152 |
| | 1607 | 1614 | 0.002094 | 2.25 | 0.2 | 0.000186133 |
| | 1608 | 1609 | 0.00201 | 1.438 | 0.2 | 0.000279555 |
| | 1608 | 1615 | 0.001508 | 2.25 | 0.2 | 0.000134044 |
| | 1609 | 1610 | 0.00201 | 0.406 | 0.2 | 0.000990148 |
| | 1609 | 1615 | 0.00059 | 2.25 | 0.2 | 5.24444E-05 |
| | 1610 | 1611 | 0.00201 | 0.438 | 0.2 | 0.000917808 |
| | 1610 | 1615 | 0.0005 | 2.25 | 0.2 | 4.44444E-05 |
| | 1611 | 1612 | 0.00201 | 0.5 | 0.2 | 0.000804 |
| | 1611 | 1615 | 0.00067 | 2.25 | 0.2 | 5.95556E-05 |
| | 1612 | 1613 | 0.00201 | 1.5 | 0.2 | 0.000268 |
| | 1612 | 1616 | 0.00067 | 2.25 | 0.2 | 5.95556E-05 |
| | 1613 | 1617 | 0.00335 | 1.75 | 0.2 | 0.000382857 |
| | 1613 | 1616 | 0.00469 | 2.5 | 0.2 | 0.0003752 |
| | 1614 | 1615 | 0.00469 | 2 | 0.2 | 0.000469 |
| | 1615 | 1616 | 0.00469 | 2.719 | 0.2 | 0.00034498 |
| | 1616 | 1617 | 0.00469 | 2 | 0.2 | 0.000469 |

| | | BOTTOM PCB POLY LAYER NODE TO NODE | | | | |
|---|---|---|---|---|---|---|
| APPLIES TO LAYERS | FROM | TO | AREA | LENGTH | k | CONDUCTANCE |
| 13XX TO 11XX | 1501 | 1502 | 0.058 | 1.281 | 0.2 | 0.009055425 |
| | 1501 | 1507 | 0.029 | 1.281 | 0.2 | 0.004527713 |
| | 1501 | 1514 | 0.0677 | 1.281 | 0.2 | 0.010569867 |
| | 1502 | 1503 | 0.058 | 1.344 | 0.2 | 0.008630952 |
| | 1502 | 1507 | 0.0302 | 2.25 | 0.2 | 0.002684444 |
| | 1503 | 1504 | 0.058 | 1.219 | 0.2 | 0.009515997 |
| | 1503 | 1508 | 0.0217 | 2.25 | 0.2 | 0.001928889 |
| | 1504 | 1505 | 0.058 | 0.906 | 0.2 | 0.012803532 |
| | 1504 | 1509 | 0.00846 | 2.25 | 0.2 | 0.000752 |
| | 1504 | 1510 | 0.00725 | 2.25 | 0.2 | 0.000644444 |
| | 1504 | 1511 | 0.00967 | 2.25 | 0.2 | 0.000859556 |
| | 1505 | 1506 | 0.058 | 1.5 | 0.2 | 0.007733333 |
| | 1505 | 1512 | 0.00967 | 2.25 | 0.2 | 0.000859556 |
| | 1506 | 1517 | 0.058 | 1.75 | 0.2 | 0.006628571 |
| | 1506 | 1513 | 0.0463 | 2.25 | 0.2 | 0.004293333 |
| | 1507 | 1508 | 0.029 | 1.344 | 0.2 | 0.004315476 |
| | 1507 | 1514 | 0.0302 | 2.5 | 0.2 | 0.002416 |
| | 1508 | 1509 | 0.029 | 1.438 | 0.2 | 0.00403338 |
| | 1508 | 1515 | 0.029 | 2.5 | 0.2 | 0.00232 |
| | 1509 | 1510 | 0.029 | 0.406 | 0.2 | 0.014285714 |
| | 1509 | 1515 | 0.00864 | 2.5 | 0.2 | 0.0006912 |
| | 1510 | 1511 | 0.029 | 0.438 | 0.2 | 0.013242009 |
| | 1510 | 1515 | 0.00725 | 2.5 | 0.2 | 0.00058 |
| | 1511 | 1512 | 0.029 | 0.5 | 0.2 | 0.0116 |
| | 1511 | 1515 | 0.00967 | 2.5 | 0.2 | 0.0007736 |
| | 1512 | 1513 | 0.029 | 1.5 | 0.2 | 0.003866667 |
| | 1512 | 1516 | 0.00967 | 2.5 | 0.2 | 0.0007736 |
| | 1513 | 1517 | 0.029 | 1.75 | 0.2 | 0.003314286 |
| | 1513 | 1516 | 0.0483 | 2.5 | 0.2 | 0.003864 |
| | 1514 | 1515 | 0.0677 | 2 | 0.2 | 0.00677 |
| | 1515 | 1516 | 0.0677 | 2.719 | 0.2 | 0.004979772 |
| | 1516 | 1517 | 0.0677 | 2 | 0.2 | 0.00677 |

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| LAYERS | FROM | TO | A1.2 | L-Cu | L-poly | k-Cu | k-poly | hc' | hc | | K1 | K2 | K0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 16XX TO 15XX | 1601 | 1501 | 8 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.5464 | 115223.9 | 165.4602 | 1.532061 |
| | 1602 | 1502 | 4.688 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.90619 | 67521.19 | 96.95967 | 0.897788 |
| APPLIES TO | 1603 | 1503 | 3.375 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.652388 | 48610.07 | 69.80352 | 0.646338 |
| ALL LAYER | 1604 | 1504 | 3.938 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.761215 | 56718.96 | 81.44778 | 0.754157 |
| TO LAYER | 1605 | 1505 | 1.5 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.28995 | 21604.48 | 31.02378 | 0.287261 |
| CONDUCTANCES | 1606 | 1506 | 7.5 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.44975 | 108022.4 | 155.1189 | 1.436307 |
| | 1607 | 1507 | 2.344 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.453095 | 33760.6 | 48.47983 | 0.448894 |
| | 1608 | 1508 | 1.688 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.32629 | 24312.24 | 34.9121 | 0.323265 |
| | 1609 | 1509 | 0.6536 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.126341 | 9413.791 | 13.5181 | 0.125169 |
| | 1610 | 1510 | 0.562 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.108635 | 8094.478 | 11.62358 | 0.107627 |
| | 1611 | 1511 | 0.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.144975 | 10802.24 | 15.51189 | 0.143631 |
| | 1612 | 1512 | 0.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.144975 | 10802.24 | 15.51189 | 0.143631 |
| | 1613 | 1513 | 3.75 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 0.724875 | 54011.19 | 77.55946 | 0.718153 |
| | 1614 | 1514 | 5.471 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.057544 | 78798.73 | 113.1541 | 1.047738 |
| | 1615 | 1515 | 8.531 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.649042 | 122871.9 | 176.4426 | 1.633751 |
| | 1616 | 1516 | 10.5 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 2.02965 | 151231.3 | 217.1665 | 2.01083 |
| | 1617 | 1517 | 8 | 0.00067 | 0.00967 | 9.65 | | 0.2 | 0.1933 | 1.5464 | 115223.9 | 165.4602 | 1.532061 |

| FROM | TO | AREA | k-Ni | L1 | K1 | R1 | K tot | k (Cu/poly) | hc' | hc | L2 | K2 | K0 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2011 | 101 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2013 | 301 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2015 | 501 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2012 | 201 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2014 | 401 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2016 | 601 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2021 | 102 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.033236 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2023 | 302 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.033236 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2025 | 502 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.033236 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2022 | 202 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.342951 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2024 | 402 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.342951 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2026 | 602 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.342951 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2031 | 103 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.875345 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2033 | 303 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.875345 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2035 | 503 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.875345 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2032 | 203 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.059644 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2034 | 403 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.059644 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2036 | 603 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.059644 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2041 | 104 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2043 | 304 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2045 | 504 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2042 | 204 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.372773 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000198 |
| 2044 | 404 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.372773 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000198 |
| 2046 | 604 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.372773 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000198 |
| 2051 | 105 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.656509 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2053 | 305 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.656509 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2055 | 505 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 0.656509 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2052 | 205 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.044733 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2054 | 405 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.044733 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2056 | 605 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.044733 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2061 | 106 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2063 | 306 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2065 | 506 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |

| 2251 | 125 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 2253 | 325 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2255 | 525 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2252 | 225 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2254 | 425 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2256 | 625 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2261 | 126 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2263 | 326 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2265 | 526 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2262 | 226 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2264 | 426 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2266 | 626 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2271 | 127 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2273 | 327 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2275 | 527 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2272 | 227 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2274 | 427 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2276 | 627 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2281 | 128 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2283 | 328 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2285 | 528 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2282 | 228 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2284 | 428 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2286 | 628 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2291 | 129 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2293 | 329 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2295 | 529 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2292 | 229 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2294 | 429 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2296 | 629 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2301 | 130 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2303 | 330 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2305 | 530 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 1.313018 | 0.2 | 0.1773 | 0.000362 | 0.25 | 0.001632 | 0.000296 |
| 2302 | 230 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2304 | 430 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |
| 2306 | 630 | 0.000139 | 1.77 | 0.0165 | 0.014911 | 67.06499 | 0.089465 | 9.65 | 1.476 | 0.000205 | 0.25 | 0.005365 | 0.000197 |

| FROM | TO | | AREA | k-Ni | L1 | K1 | R1 | Ktot | k(Cu/poly) | hc' | hc | | L2 | K2 | KO |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3011 | 1101 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 14.00553 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3013 | 1301 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 14.00553 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3015 | 1501 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 14.00553 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3012 | 1201 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 9.542982 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3014 | 1401 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 9.542982 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3016 | 1601 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 9.542982 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3021 | 1102 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.440436 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3023 | 1302 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.440436 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3025 | 1502 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.440436 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3022 | 1202 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 5.069709 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3024 | 1402 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 5.069709 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3026 | 1602 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 5.069709 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3031 | 1103 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3033 | 1303 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3035 | 1503 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3032 | 1203 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3034 | 1403 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3036 | 1603 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3041 | 1104 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3043 | 1304 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3045 | 1504 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3042 | 1204 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3044 | 1404 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3046 | 1604 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.771491 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3051 | 1105 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 6.127418 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3053 | 1305 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 6.127418 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3055 | 1505 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 6.127418 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3052 | 1205 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.175055 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3054 | 1405 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.175055 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3056 | 1605 | | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 4.175055 | 9.65 | 1.476 | 0.002052 | | 0.025 | 0.53654 | 0.002043 |
| 3061 | 1106 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3063 | 1306 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |
| 3065 | 1506 | | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 7.002764 | 0.2 | 0.1773 | 0.000362 | | 0.025 | 0.01632 | 0.000354 |

| | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 3154 | 1415 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 14.91091 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002044 |
| 3156 | 1615 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 14.91091 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002044 |
| 3161 | 1116 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 24.94735 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3163 | 1316 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 24.94735 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3165 | 1516 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 24.94735 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3162 | 1216 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 16.99844 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002044 |
| 3164 | 1416 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 16.99844 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002044 |
| 3166 | 1616 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 16.99844 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002044 |
| 3171 | 1117 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3173 | 1317 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3175 | 1517 | 0.00204 | 1.77 | 0.0165 | 0.218836 | 4.569624 | 5.470909 | 0.2 | 0.1773 | 0.000362 | 0.025 | 0.01632 | 0.000354 |
| 3172 | 1217 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 3.727727 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002043 |
| 3174 | 1417 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 3.727727 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002043 |
| 3176 | 1617 | 0.00139 | 1.77 | 0.0165 | 0.149109 | 6.706499 | 3.727727 | 9.65 | 1.476 | 0.002052 | 0.025 | 0.53654 | 0.002043 |

PIN TO PIN CONDUCTANCES

| FROM | TO | # OF PINS | AREA | ADJ AREA | LENGTH | k | k |
|---|---|---|---|---|---|---|---|
| 2011 | 2012 | 6 | 0.0008553 | 0.0051318 | 0.06201 | 1.77 | 0.146481 |
| 2021 | 2022 | 23 | 0.0008553 | 0.0196719 | 0.237705 | 1.77 | 0.146481 |
| 2031 | 2032 | 4 | 0.0008553 | 0.0034212 | 0.04134 | 1.77 | 0.146481 |
| 2041 | 2042 | 25 | 0.0008553 | 0.0213825 | 0.258375 | 1.77 | 0.146481 |
| 2051 | 2052 | 3 | 0.0008553 | 0.0025659 | 0.031005 | 1.77 | 0.146481 |

# APPENDIX M.  ITAS CONDUCTANCE DATA

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 1 | 1 | 1 | 901 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 2 | 1 | 2 | 902 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 3 | 1 | 3 | 903 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 4 | 1 | 4 | 904 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 5 | 1 | 5 | 905 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 6 | 1 | 6 | 906 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 7 | 1 | 7 | 907 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 8 | 1 | 8 | 908 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 9 | 1 | 9 | 909 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 10 | 1 | 10 | 910 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 11 | 1 | 11 | 911 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 12 | 1 | 12 | 912 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 13 | 1 | 13 | 613 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 14 | 1 | 14 | 614 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 15 | 1 | 15 | 615 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 16 | 1 | 16 | 616 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 17 | 1 | 17 | 617 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 18 | 1 | 18 | 618 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                   End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 19 | 1 | 19 | 619 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 20 | 1 | 20 | 620 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 21 | 1 | 21 | 621 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 22 | 1 | 22 | 622 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 23 | 1 | 23 | 623 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 24 | 1 | 24 | 624 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 25 | 1 | 25 | 625 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 26 | 1 | 26 | 626 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 27 | 1 | 27 | 627 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 28 | 1 | 28 | 628 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 29 | 1 | 29 | 629 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 30 | 1 | 30 | 630 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 31 | 1 | 31 | 601 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 32 | 1 | 32 | 602 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 33 | 1 | 33 | 603 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 34 | 1 | 34 | 604 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 35 | 1 | 35 | 605 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 36 | 1 | 36 | 606 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                   End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 1 | 1 | 1 | 901 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 2 | 1 | 2 | 902 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 3 | 1 | 3 | 903 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 4 | 1 | 4 | 904 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 5 | 1 | 5 | 905 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 6 | 1 | 6 | 906 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 7 | 1 | 7 | 907 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 8 | 1 | 8 | 908 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 9 | 1 | 9 | 909 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 10 | 1 | 10 | 910 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 11 | 1 | 11 | 911 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 12 | 1 | 12 | 912 | 1000 | L | GEOMETRY TO HOUSING NODE |
| 13 | 1 | 13 | 613 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 14 | 1 | 14 | 614 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 15 | 1 | 15 | 615 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 16 | 1 | 16 | 616 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 17 | 1 | 17 | 617 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 18 | 1 | 18 | 618 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 19 | 1 | 19 | 619 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 20 | 1 | 20 | 620 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 21 | 1 | 21 | 621 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 22 | 1 | 22 | 622 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 23 | 1 | 23 | 623 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 24 | 1 | 24 | 624 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 25 | 1 | 25 | 625 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 26 | 1 | 26 | 626 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 27 | 1 | 27 | 627 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 28 | 1 | 28 | 628 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 29 | 1 | 29 | 629 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 30 | 1 | 30 | 630 | 1000 | L | GEOMETRY TO PCB1 THERMAL LAYER |
| 31 | 1 | 31 | 601 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 32 | 1 | 32 | 602 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 33 | 1 | 33 | 603 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 34 | 1 | 34 | 604 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 35 | 1 | 35 | 605 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 36 | 1 | 36 | 606 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 37 | 1 | 37 | 607 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 38 | 1 | 38 | 608 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 39 | 1 | 39 | 609 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 40 | 1 | 40 | 610 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 41 | 1 | 41 | 611 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 42 | 1 | 42 | 612 | 1000 | L | GEOMETRY TO TOP PCB THERMAL LAYER |
| 43 | 1 | 43 | 1601 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 44 | 1 | 44 | 1602 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 45 | 1 | 45 | 1603 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 46 | 1 | 46 | 1604 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 47 | 1 | 47 | 1605 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 48 | 1 | 48 | 1606 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 49 | 1 | 49 | 1607 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 50 | 1 | 50 | 1608 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 51 | 1 | 51 | 1609 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 52 | 1 | 52 | 1610 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 53 | 1 | 53 | 1611 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 54 | 1 | 54 | 1612 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 55 | 1 | 55 | 1613 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 56 | 1 | 56 | 1614 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 57 | 1 | 57 | 1615 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 58 | 1 | 58 | 1616 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 59 | 1 | 59 | 1617 | 1000 | L | GEOMETRY TO BOTTOM PCB THERMA LYR |
| 60 | 1 | 913 | 912 | 178.47 | L | EQUIPMENT PLATE TO EPS HOUSING |
| 61 | 1 | 901 | 905 | .26135 | L | HOUSING NODES TO HOUSING NODES |
| 62 | 1 | 901 | 906 | 1.5333 | L | HOUSING NODES TO HOUSING NODES |
| 63 | 1 | 901 | 911 | .27461 | L | HOUSING NODES TO HOUSING NODES |
| 64 | 1 | 901 | 912 | 1.3563 | L | HOUSING NODES TO HOUSING NODES |
| 65 | 1 | 902 | 903 | .60110 | L | HOUSING NODES TO HOUSING NODES |
| 66 | 1 | 902 | 906 | .42339 | L | HOUSING NODES TO HOUSING NODES |
| 67 | 1 | 902 | 907 | .27461 | L | HOUSING NODES TO HOUSING NODES |
| 68 | 1 | 902 | 912 | .42306 | L | HOUSING NODES TO HOUSING NODES |
| 69 | 1 | 903 | 904 | .60110 | L | HOUSING NODES TO HOUSING NODES |
| 70 | 1 | 903 | 906 | .42306 | L | HOUSING NODES TO HOUSING NODES |
| 71 | 1 | 903 | 912 | .42306 | L | HOUSING NODES TO HOUSING NODES |
| 72 | 1 | 904 | 905 | .60110 | L | HOUSING NODES TO HOUSING NODES |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 73 | 1 | 904 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 74 | 1 | 904 | 912 | .42306 | L | HOUSING TO HOUSING NODES |
| 75 | 1 | 905 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 76 | 1 | 905 | 912 | .42306 | L | HOUSING TO HOUSING NODES |
| 77 | 1 | 907 | 906 | 13.2667 | L | HOUSING TO HOUSING NODES |
| 78 | 1 | 907 | 908 | .27461 | L | HOUSING TO HOUSING NODES |
| 79 | 1 | 907 | 912 | 13.2667 | L | HOUSING TO HOUSING NODES |
| 80 | 1 | 908 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 81 | 1 | 908 | 910 | .60110 | L | HOUSING TO HOUSING NODES |
| 82 | 1 | 908 | 912 | .42306 | L | HOUSING TO HOUSING NODES |
| 83 | 1 | 909 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 84 | 1 | 909 | 910 | .60110 | L | HOUSING TO HOUSING NODES |
| 85 | 1 | 909 | 912 | .42306 | L | HOUSING TO HOUSING NODES |
| 86 | 1 | 910 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 87 | 1 | 910 | 911 | .60110 | L | HOUSING TO HOUSING NODES |
| 88 | 1 | 910 | 912 | .42306 | L | HOUSING TO HOUSING NODES |
| 89 | 1 | 911 | 906 | .42306 | L | HOUSING TO HOUSING NODES |
| 90 | 1 | 911 | 912 | .42306 | L | HOUSING TO HOUSING NODES |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
       F1Save/Purge         F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 91 | 1 | 921 | 901 | .05856 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 92 | 1 | 921 | 907 | .05856 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 93 | 1 | 921 | 902 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 94 | 1 | 921 | 903 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 95 | 1 | 921 | 904 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 96 | 1 | 921 | 905 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 97 | 1 | 921 | 906 | 4.31 | L | BOTTOM RAIL TO EPS HOUSING (+Y) |
| 98 | 1 | 922 | 901 | .08784 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 99 | 1 | 922 | 907 | .08784 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 100 | 1 | 922 | 902 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 101 | 1 | 922 | 903 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 102 | 1 | 922 | 904 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 103 | 1 | 922 | 905 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (+Y) |
| 104 | 1 | 923 | 901 | .04661 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 105 | 1 | 923 | 907 | .04661 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 106 | 1 | 923 | 902 | 8.19666 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 107 | 1 | 923 | 903 | 8.95905 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 108 | 1 | 923 | 904 | 8.95905 | L | TOP RAIL TO EPS HOUSING (+Y) |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
       F1Save/Purge         F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 109 | 1 | 923 | 905 | 8.19666 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 110 | 1 | 923 | 906 | 3.43076 | L | TOP RAIL TO EPS HOUSING (+Y) |
| 111 | 1 | 924 | 901 | .05856 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 112 | 1 | 924 | 907 | .05856 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 113 | 1 | 924 | 908 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 114 | 1 | 924 | 909 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 115 | 1 | 924 | 910 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 116 | 1 | 924 | 911 | 11.2443 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 117 | 1 | 924 | 912 | 4.31 | L | BOTTOM RAIL TO EPS HOUSING (-Y) |
| 118 | 1 | 925 | 901 | .08784 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 119 | 1 | 925 | 907 | .08784 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 120 | 1 | 925 | 908 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 121 | 1 | 925 | 909 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 122 | 1 | 925 | 910 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 123 | 1 | 925 | 911 | 16.8760 | L | MIDDLE RAIL TO EPS HOUSING (-Y) |
| 124 | 1 | 926 | 901 | .04661 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 125 | 1 | 926 | 907 | .04661 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 126 | 1 | 926 | 908 | 8.19666 | L | TOP RAIL TO EPS HOUSING (-Y) |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 127 | 1 | 926 | 909 | 8.95905 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 128 | 1 | 926 | 910 | 8.95905 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 129 | 1 | 926 | 911 | 8.19666 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 130 | 1 | 926 | 912 | 3.43076 | L | TOP RAIL TO EPS HOUSING (-Y) |
| 131 | 1 | 1601 | 924 | .85144 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 132 | 1 | 1602 | 924 | 1.3282 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 133 | 1 | 1603 | 924 | .95701 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 134 | 1 | 1604 | 924 | 1.1171 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 135 | 1 | 1605 | 924 | .42572 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 136 | 1 | 1606 | 924 | 2.12859 | L | BOTTOM PCB Cu LYR TO BTM RL (-Y) |
| 137 | 1 | 1617 | 924 | .85144 | L |  |
| 138 | 1 | 1601 | 921 | .85144 | L | BOTTOM PCB Cu LYR TO BTM RL (+Y) |
| 139 | 1 | 1614 | 921 | 1.32824 | L | BOTTOM PCB Cu LYR TO BTM RL (+Y) |
| 140 | 1 | 1615 | 921 | 2.0741 | L | BOTTOM PCB Cu LYR TO BTM RL (+Y) |
| 141 | 1 | 1616 | 921 | 2.55430 | L | BOTTOM PCB Cu LYR TO BTM RL (+Y) |
| 142 | 1 | 1617 | 921 | .85144 | L | BOTTOM PCB Cu LYR TO BTM RL (+Y) |
| 143 | 1 | 1101 | 925 | .05918 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 144 | 1 | 1102 | 925 | .09233 | L | BTM PCB POLY LYR TO MID RL (-Y) |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 145 | 1 | 1103 | 925 | .06652 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 146 | 1 | 1104 | 925 | .07765 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 147 | 1 | 1105 | 925 | .02959 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 148 | 1 | 1106 | 925 | .14796 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 149 | 1 | 1117 | 925 | .059184 | L | BTM PCB POLY LYR TO MID RL (-Y) |
| 150 | 1 | 1101 | 922 | .059184 | L | BTM PCB POLY LYR TO MID RL (+Y) |
| 151 | 1 | 1114 | 922 | .092328 | L | BTM PCB POLY LYR TO MID RL (+Y) |
| 152 | 1 | 1115 | 922 | .144173 | L | BTM PCB POLY LYR TO MID RL (+Y) |
| 153 | 1 | 1116 | 922 | .177553 | L | BTM PCB POLY LYR TO MID RL (+Y) |
| 154 | 1 | 1117 | 922 | .059184 | L | BTM PCB POLY LYR TO MID RL (+Y) |
| 155 | 1 | 601 | 925 | 1.11579 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 156 | 1 | 602 | 925 | 1.52147 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 157 | 1 | 603 | 925 | .405689 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 158 | 1 | 604 | 925 | 1.62273 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 159 | 1 | 605 | 925 | .405689 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 160 | 1 | 606 | 925 | 2.23125 | L | TOP PCB Cu LYR TO MID RL (-Y) |
| 161 | 1 | 625 | 922 | 2.23125 | L | TOP PCB Cu LYR TO MID RL (+Y) |
| 162 | 1 | 626 | 922 | 1.11579 | L | TOP PCB Cu LYR TO MID RL (+Y) |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 163 | 1 | 627 | 922 | 1.11579 | L | TOP PCB Cu LYR TO MID RL (+Y) |
| 164 | 1 | 628 | 922 | 1.11579 | L | TOP PCB Cu LYR TO MID RL (+Y) |
| 165 | 1 | 629 | 922 | 1.11579 | L | TOP PCB Cu LYR TO MID RL (+Y) |
| 166 | 1 | 630 | 922 | 2.23125 | L | TOP PCB Cu LYR TO MID RL (+Y) |
| 167 | 1 | 101 | 926 | .08179 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 168 | 1 | 102 | 926 | .11152 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 169 | 1 | 103 | 926 | .02974 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 170 | 1 | 104 | 926 | .11894 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 171 | 1 | 105 | 926 | .02974 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 172 | 1 | 106 | 926 | .16355 | L | TOP PCB POLY LYR TO MID RL (-Y) |
| 173 | 1 | 125 | 923 | .16355 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 174 | 1 | 126 | 923 | .08179 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 175 | 1 | 127 | 923 | .08179 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 176 | 1 | 128 | 923 | .08179 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 177 | 1 | 129 | 923 | .08179 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 178 | 1 | 130 | 923 | .16355 | L | TOP PCB POLY LYR TO TOP RL (+Y) |
| 179 | 1 | 601 | 602 | .018635 | L | TOP PCB THERMAL LAYER NODE-NODE |
| 180 | 1 | 601 | 607 | .006764 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 181 | 1 | 602 | 603 | .025866 | L | TOP PCB THERMAL LYR NODE-NODE |
| 182 | 1 | 602 | 608 | .092383 | L | |
| 183 | 1 | 603 | 604 | .02423 | L | |
| 184 | 1 | 603 | 609 | .002573 | L | |
| 185 | 1 | 604 | 605 | .02457 | L | |
| 186 | 1 | 604 | 610 | .009852 | L | |
| 187 | 1 | 605 | 606 | .018635 | L | |
| 188 | 1 | 605 | 611 | .00257 | L | |
| 189 | 1 | 606 | 612 | .013565 | L | |
| 190 | 1 | 607 | 608 | .02286 | L | |
| 191 | 1 | 607 | 613 | .009630 | L | |
| 192 | 1 | 608 | 609 | .019815 | L | |
| 193 | 1 | 608 | 613 | .002617 | L | |
| 194 | 1 | 608 | 614 | .009630 | L | |
| 195 | 1 | 608 | 615 | .04057 | L | |
| 196 | 1 | 609 | 610 | .02972 | L | |
| 197 | 1 | 609 | 615 | .003664 | L | |
| 198 | 1 | 610 | 611 | .02972 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 199 | 1 | 610 | 615 | .005234 | L | TOP PCB THRML LYR NODE-NODE |
| 200 | 1 | 610 | 616 | .008793 | L | |
| 201 | 1 | 611 | 612 | .022863 | L | |
| 202 | 1 | 611 | 616 | .008793 | L | |
| 203 | 1 | 611 | 617 | .002617 | L | |
| 204 | 1 | 612 | 617 | .007013 | L | |
| 205 | 1 | 612 | 618 | .01230 | L | |
| 206 | 1 | 613 | 614 | .007164 | L | |
| 207 | 1 | 613 | 619 | .024189 | L | |
| 208 | 1 | 614 | 615 | .008141 | L | |
| 209 | 1 | 614 | 620 | .018940 | L | |
| 210 | 1 | 615 | 616 | .008141 | L | |
| 211 | 1 | 615 | 621 | .01832 | L | |
| 212 | 1 | 616 | 617 | .008141 | L | |
| 213 | 1 | 616 | 622 | .018940 | L | |
| 214 | 1 | 617 | 618 | .007164 | L | |
| 215 | 1 | 617 | 623 | .018940 | L | |
| 216 | 1 | 618 | 624 | .010293 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 217 | 1 | 619 | 620 | .008770 | L | TOP PCB THERMAL LYR NODE-NODE |
| 218 | 1 | 619 | 625 | .023410 | L | |
| 219 | 1 | 620 | 621 | .009967 | L | |
| 220 | 1 | 620 | 625 | .018329 | L | |
| 221 | 1 | 621 | 622 | .009967 | L | |
| 222 | 1 | 621 | 627 | .017731 | L | |
| 223 | 1 | 622 | 623 | .014145 | L | |
| 224 | 1 | 622 | 628 | .012913 | L | |
| 225 | 1 | 623 | 624 | .008770 | L | |
| 226 | 1 | 623 | 629 | .018324 | L | |
| 227 | 1 | 624 | 630 | .009961 | L | |
| 228 | 1 | 625 | 626 | .010684 | L | |
| 229 | 1 | 626 | 627 | .012141 | L | |
| 230 | 1 | 627 | 628 | .012141 | L | |
| 231 | 1 | 628 | 629 | .012141 | L | |
| 232 | 1 | 629 | 630 | .010684 | L | |
| 233 | 1 | 501 | 502 | .005651 | L | TOP PCB LOWEST POLY LYR NODE-NODE |
| 234 | 1 | 501 | 507 | .002025 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 235 | 1 | 502 | 503 | .005650 | L | TOP PCB BTM POLY LYR NODE-NODE |
| 236 | 1 | 502 | 508 | .002025 | L | |
| 237 | 1 | 503 | 504 | .007733 | L | |
| 238 | 1 | 503 | 509 | .002761 | L | |
| 239 | 1 | 504 | 505 | .007346 | L | |
| 240 | 1 | 504 | 510 | .007364 | L | |
| 241 | 1 | 505 | 506 | .007346 | L | |
| 242 | 1 | 505 | 511 | .002946 | L | |
| 243 | 1 | 506 | 512 | .005650 | L | |
| 244 | 1 | 507 | 508 | .007364 | L | |
| 245 | 1 | 507 | 513 | .004050 | L | |
| 246 | 1 | 508 | 509 | .006839 | L | |
| 247 | 1 | 508 | 513 | .004488 | L | |
| 248 | 1 | 508 | 514 | .009359 | L | |
| 249 | 1 | 508 | 515 | .001224 | L | |
| 250 | 1 | 509 | 510 | .004488 | L | |
| 251 | 1 | 509 | 515 | .0004087 | L | |
| 252 | 1 | 510 | 511 | .008891 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 253 | 1 | 510 | 515 | .002449 | L | TOP PCB BTM POLY LYR NODE-NODE |
| 254 | 1 | 510 | 516 | .004080 | L | |
| 255 | 1 | 511 | 512 | .006839 | L | |
| 256 | 1 | 511 | 516 | .004080 | L | |
| 257 | 1 | 511 | 517 | .001224 | L | |
| 258 | 1 | 512 | 517 | .003264 | L | |
| 259 | 1 | 512 | 518 | .005712 | L | |
| 260 | 1 | 513 | 514 | .002018 | L | |
| 261 | 1 | 513 | 519 | .007217 | L | |
| 262 | 1 | 514 | 515 | .002285 | L | |
| 263 | 1 | 514 | 520 | .005670 | L | |
| 264 | 1 | 515 | 516 | .002284 | L | |
| 265 | 1 | 515 | 521 | .005670 | L | |
| 266 | 1 | 516 | 517 | .002285 | L | |
| 267 | 1 | 516 | 522 | .005670 | L | |
| 268 | 1 | 517 | 518 | .002010 | L | |
| 269 | 1 | 517 | 523 | .005670 | L | |
| 270 | 1 | 518 | 524 | .007217 | L | |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur              End
        F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 271 | 1 | 519 | 520 | .002629 | L | TOP PCB BTM POLY LYR NODE-NODE |
| 272 | 1 | 519 | 525 | .006984 | L | |
| 273 | 1 | 520 | 521 | .002988 | L | |
| 274 | 1 | 520 | 526 | .005487 | L | |
| 275 | 1 | 521 | 522 | .002988 | L | |
| 276 | 1 | 521 | 527 | .005487 | L | |
| 277 | 1 | 522 | 523 | .002988 | L | |
| 278 | 1 | 522 | 528 | .005487 | L | |
| 279 | 1 | 523 | 524 | .002629 | L | |
| 280 | 1 | 523 | 529 | .005487 | L | |
| 281 | 1 | 525 | 526 | .002164 | L | |
| 282 | 1 | 526 | 527 | .002460 | L | |
| 283 | 1 | 527 | 528 | .002460 | L | |
| 284 | 1 | 528 | 529 | .002460 | L | |
| 285 | 1 | 529 | 530 | .002164 | L | |
| 286 | 1 | 401 | 402 | .018902 | L | TOP PCB GRND LYR NODE-NODE |
| 287 | 1 | 401 | 407 | .006764 | L | |
| 288 | 1 | 402 | 403 | .025866 | L | |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur              End
        F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 289 | 1 | 402 | 408 | .09238 | L | TOP PCB GRND LYR NODE-NODE |
| 290 | 1 | 403 | 404 | .02422 | L | |
| 291 | 1 | 403 | 409 | .00257 | L | |
| 292 | 1 | 404 | 405 | .02457 | L | |
| 293 | 1 | 404 | 410 | .009852 | L | |
| 294 | 1 | 405 | 406 | .01863 | L | |
| 295 | 1 | 405 | 411 | .002573 | L | |
| 296 | 1 | 406 | 412 | .013565 | L | |
| 297 | 1 | 407 | 408 | .02286 | L | |
| 298 | 1 | 407 | 413 | .009630 | L | |
| 299 | 1 | 408 | 409 | .01981 | L | |
| 300 | 1 | 408 | 413 | .002617 | L | |
| 301 | 1 | 408 | 414 | .009630 | L | |
| 302 | 1 | 408 | 415 | .04056 | L | |
| 303 | 1 | 409 | 410 | .02972 | L | |
| 304 | 1 | 409 | 415 | .003664 | L | |
| 305 | 1 | 410 | 411 | .029722 | L | |
| 306 | 1 | 410 | 415 | .005234 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 307 | 1 | 410 | 416 | .008793 | L | TOP PCB GRND LYR NODE-NODE |
| 308 | 1 | 411 | 412 | .022863 | L | |
| 309 | 1 | 411 | 416 | .008793 | L | |
| 310 | 1 | 411 | 417 | .002617 | L | |
| 311 | 1 | 412 | 417 | .007013 | L | |
| 312 | 1 | 412 | 418 | .01230 | L | |
| 313 | 1 | 413 | 414 | .007164 | L | |
| 314 | 1 | 413 | 419 | .024189 | L | |
| 315 | 1 | 414 | 415 | .008141 | L | |
| 316 | 1 | 414 | 420 | .018940 | L | |
| 317 | 1 | 415 | 416 | .008141 | L | |
| 318 | 1 | 415 | 421 | .018322 | L | |
| 319 | 1 | 416 | 417 | .008141 | L | |
| 320 | 1 | 416 | 422 | .018940 | L | |
| 321 | 1 | 417 | 418 | .007164 | L | |
| 322 | 1 | 417 | 423 | .018940 | L | |
| 323 | 1 | 418 | 424 | .010293 | L | |
| 324 | 1 | 419 | 420 | .008770 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 325 | 1 | 419 | 425 | .02341 | L | TOP PCB GRND LYR NODE-NODE |
| 326 | 1 | 420 | 421 | .009966 | L | |
| 327 | 1 | 420 | 426 | .018329 | L | |
| 328 | 1 | 421 | 422 | .009966 | L | |
| 329 | 1 | 421 | 427 | .017731 | L | |
| 330 | 1 | 422 | 423 | .014145 | L | |
| 331 | 1 | 422 | 428 | .012913 | L | |
| 332 | 1 | 423 | 424 | .008770 | L | |
| 333 | 1 | 423 | 429 | .018329 | L | |
| 334 | 1 | 424 | 430 | .009961 | L | |
| 335 | 1 | 425 | 426 | .01068 | L | |
| 336 | 1 | 426 | 427 | .01214 | L | |
| 337 | 1 | 427 | 428 | .01214 | L | |
| 338 | 1 | 428 | 429 | .01214 | L | |
| 339 | 1 | 429 | 430 | .01068 | L | |
| 340 | 1 | 301 | 302 | .005650 | L | TOP PCB MID POLY LYR NODE-NODE |
| 341 | 1 | 301 | 307 | .002025 | L | |
| 342 | 1 | 302 | 303 | .007733 | L | |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI   UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                    End
      F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 343 | 1 | 302 | 308 | .002761 | L | TOP PCB MID POLY LYR NODE-NODE |
| 344 | 1 | 303 | 304 | .007346 | L | |
| 345 | 1 | 303 | 309 | .007364 | L | |
| 346 | 1 | 304 | 305 | .007346 | L | |
| 347 | 1 | 304 | 310 | .002946 | L | |
| 348 | 1 | 305 | 306 | .005650 | L | |
| 349 | 1 | 305 | 311 | .007364 | L | |
| 350 | 1 | 306 | 312 | .004050 | L | |
| 351 | 1 | 307 | 308 | .006840 | L | |
| 352 | 1 | 307 | 313 | .004488 | L | |
| 353 | 1 | 308 | 309 | .009359 | L | |
| 354 | 1 | 308 | 313 | .001224 | L | |
| 355 | 1 | 308 | 314 | .004488 | L | |
| 356 | 1 | 308 | 315 | .000408 | L | |
| 357 | 1 | 309 | 310 | .008991 | L | |
| 358 | 1 | 309 | 315 | .016321 | L | |
| 359 | 1 | 310 | 311 | .00889 | L | |
| 360 | 1 | 310 | 315 | .002449 | L | |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI   UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                    End
      F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 361 | 1 | 310 | 316 | .004080 | L | TOP PCB MID POLY LAYER NODE-NODE |
| 362 | 1 | 311 | 312 | .006840 | L | |
| 363 | 1 | 311 | 316 | .004080 | L | |
| 364 | 1 | 311 | 317 | .001224 | L | |
| 365 | 1 | 312 | 317 | .003264 | L | |
| 366 | 1 | 312 | 318 | .005712 | L | |
| 367 | 1 | 313 | 314 | .002018 | L | |
| 368 | 1 | 313 | 319 | .007217 | L | |
| 369 | 1 | 314 | 315 | .002285 | L | |
| 370 | 1 | 314 | 320 | .005670 | L | |
| 371 | 1 | 315 | 316 | .002285 | L | |
| 372 | 1 | 315 | 321 | .005670 | L | |
| 373 | 1 | 316 | 317 | .002285 | L | |
| 374 | 1 | 316 | 322 | .005670 | L | |
| 375 | 1 | 317 | 318 | .002010 | L | |
| 376 | 1 | 317 | 323 | .005670 | L | |
| 377 | 1 | 318 | 324 | .0007217 | L | |
| 378 | 1 | 319 | 320 | .002629 | L | |

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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 379 | 1 | 319 | 325 | .006984 | L | TOP PCB MID POLY LYR NODE-NODE |
| 380 | 1 | 320 | 321 | .002988 | L | |
| 381 | 1 | 320 | 326 | .005487 | L | |
| 382 | 1 | 321 | 322 | .002988 | L | |
| 383 | 1 | 321 | 327 | .005487 | L | |
| 384 | 1 | 322 | 323 | .002988 | L | |
| 385 | 1 | 322 | 328 | .005487 | L | |
| 386 | 1 | 323 | 324 | .002629 | L | |
| 387 | 1 | 323 | 329 | .005487 | L | |
| 388 | 1 | 324 | 330 | .06984 | L | |
| 389 | 1 | 325 | 326 | .002164 | L | |
| 390 | 1 | 326 | 327 | .002460 | L | |
| 391 | 1 | 327 | 328 | .002460 | L | |
| 392 | 1 | 328 | 329 | .002460 | L | |
| 393 | 1 | 329 | 330 | .002164 | L | |
| 394 | 1 | 201 | 202 | .018902 | L | TOP PCB TOP Cu LYR NODE-NODE |
| 395 | 1 | 201 | 207 | .006764 | L | |
| 396 | 1 | 202 | 203 | .025866 | L | |

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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 397 | 1 | 202 | 208 | .09238 | L | TOP PCB TOP Cu LYR NODE-NODE |
| 398 | 1 | 203 | 2045 | .02423 | L | |
| 399 | 1 | 203 | 209 | .002573 | L | |
| 400 | 1 | 204 | 205 | .02457 | L | |
| 401 | 1 | 204 | 210 | .00985 | L | |
| 402 | 1 | 205 | 206 | .01863 | L | |
| 403 | 1 | 205 | 211 | .002573 | L | |
| 404 | 1 | 206 | 212 | .013565 | L | |
| 405 | 1 | 207 | 208 | .022863 | L | |
| 406 | 1 | 207 | 213 | .009630 | L | |
| 407 | 1 | 208 | 209 | .01981 | L | |
| 408 | 1 | 208 | 213 | .002670 | L | |
| 409 | 1 | 208 | 214 | .009630 | L | |
| 410 | 1 | 208 | 215 | .04056 | L | |
| 411 | 1 | 209 | 210 | .02972 | L | |
| 412 | 1 | 209 | 215 | .003663 | L | |
| 413 | 1 | 210 | 211 | .02972 | L | |
| 414 | 1 | 210 | 215 | .005234 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 415 | 1 | 210 | 216 | .008793 | L | TOP PCB TOP Cu LYR NODE-NODE |
| 416 | 1 | 211 | 212 | .02286 | L | |
| 417 | 1 | 211 | 216 | .008793 | L | |
| 418 | 1 | 211 | 217 | .0026170 | L | |
| 419 | 1 | 212 | 217 | .0070134 | L | |
| 420 | 1 | 212 | 218 | .001230 | L | |
| 421 | 1 | 213 | 214 | .0071641 | L | |
| 422 | 1 | 213 | 219 | .024190 | L | |
| 423 | 1 | 214 | 215 | .008141 | L | |
| 424 | 1 | 214 | 220 | .018940 | L | |
| 425 | 1 | 215 | 216 | .0081410 | L | |
| 426 | 1 | 215 | 221 | .018322 | L | |
| 427 | 1 | 216 | 217 | .0189397 | L | |
| 428 | 1 | 216 | 222 | .018940 | L | |
| 429 | 1 | 217 | 218 | .007164 | L | |
| 430 | 1 | 217 | 223 | .0018940 | L | |
| 431 | 1 | 218 | 224 | .010293 | L | |
| 432 | 1 | 219 | 220 | .008770 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 433 | 1 | 219 | 225 | .02341 | L | TOP PCB TOP Cu LYR NODE-NODE |
| 434 | 1 | 220 | 221 | .009966 | L | |
| 435 | 1 | 220 | 226 | .018329 | L | |
| 436 | 1 | 221 | 222 | .009966 | L | |
| 437 | 1 | 221 | 227 | .017731 | L | |
| 438 | 1 | 222 | 223 | .014145 | L | |
| 439 | 1 | 222 | 228 | .01291 | L | |
| 440 | 1 | 223 | 224 | .008770 | L | |
| 441 | 1 | 223 | 229 | .018329 | L | |
| 442 | 1 | 224 | 230 | .009961 | L | |
| 443 | 1 | 225 | 226 | .010684 | L | |
| 444 | 1 | 226 | 227 | .012141 | L | |
| 445 | 1 | 227 | 228 | .012141 | L | |
| 446 | 1 | 228 | 229 | .012141 | L | |
| 447 | 1 | 229 | 230 | .010684 | L | TOP PCB TOP POLY LYR NODE-NODE |
| 448 | 1 | 101 | 102 | .005650 | L | |
| 449 | 1 | 101 | 107 | .002025 | L | |
| 450 | 1 | 102 | 103 | .007733 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 451 | 1 | 102 | 108 | .002761 | L | TOP PCB TOP POLY LYR NODE-NODE |
| 452 | 1 | 103 | 104 | .0073456 | L | |
| 453 | 1 | 103 | 109 | .0073638 | L | |
| 454 | 1 | 104 | 105 | .007346 | L | |
| 455 | 1 | 104 | 110 | .0029455 | L | |
| 456 | 1 | 105 | 106 | .005650 | L | |
| 457 | 1 | 105 | 111 | .0073638 | L | |
| 458 | 1 | 106 | 112 | .004050 | L | |
| 459 | 1 | 107 | 108 | .006839 | L | |
| 460 | 1 | 107 | 113 | .004488 | L | |
| 461 | 1 | 108 | 109 | .009359 | L | |
| 462 | 1 | 108 | 113 | .001224 | L | |
| 463 | 1 | 108 | 114 | .004488 | L | |
| 464 | 1 | 108 | 115 | .0004087 | L | |
| 465 | 1 | 109 | 110 | .0088991 | L | |
| 466 | 1 | 109 | 115 | .01632 | L | |
| 467 | 1 | 110 | 111 | .008891 | L | |
| 468 | 1 | 110 | 115 | .002449 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 469 | 1 | 110 | 116 | .004080 | L | TOP PCB TOP POLY LYR NODE-NODE |
| 470 | 1 | 111 | 112 | .006839 | L | |
| 471 | 1 | 111 | 116 | .004080 | L | |
| 472 | 1 | 111 | 117 | .001224 | L | |
| 473 | 1 | 112 | 117 | .032642 | L | |
| 474 | 1 | 112 | 118 | .005712 | L | |
| 475 | 1 | 113 | 114 | .002018 | L | |
| 476 | 1 | 113 | 119 | .007217 | L | |
| 477 | 1 | 114 | 115 | .002285 | L | |
| 478 | 1 | 114 | 120 | .005670 | L | |
| 479 | 1 | 115 | 116 | .002285 | L | |
| 480 | 1 | 115 | 621 | .005670 | L | |
| 481 | 1 | 116 | 117 | .002845 | L | |
| 482 | 1 | 116 | 122 | .005670 | L | |
| 483 | 1 | 117 | 118 | .002010 | L | |
| 484 | 1 | 117 | 123 | .005670 | L | |
| 485 | 1 | 118 | 124 | .007217 | L | |
| 486 | 1 | 119 | 120 | .002629 | L | |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 487 | 1 | 119 | 125 | .006984 | L | TOP PCB TOP POLY LYR NODE-NODE |
| 488 | 1 | 120 | 121 | .002988 | L | |
| 489 | 1 | 120 | 126 | .005487 | L | |
| 490 | 1 | 121 | 122 | .002988 | L | |
| 491 | 1 | 121 | 127 | .005487 | L | |
| 492 | 1 | 122 | 123 | .002988 | L | |
| 493 | 1 | 122 | 128 | .005487 | L | |
| 494 | 1 | 123 | 124 | .002629 | L | |
| 495 | 1 | 123 | 129 | .005487 | L | |
| 496 | 1 | 124 | 130 | .006984 | L | |
| 497 | 1 | 125 | 126 | .002164 | L | |
| 498 | 1 | 126 | 127 | .002460 | L | |
| 499 | 1 | 127 | 128 | .002460 | L | |
| 500 | 1 | 128 | 129 | .002460 | L | |
| 501 | 1 | 129 | 130 | .000164 | L | |
| 502 | 1 | 601 | 501 | .625 | L | TOP PCB LAYER 6XX TO 5XX |
| 503 | 1 | 602 | 502 | .85227 | L | TOP PCB LAYER 6XX TO 5XX |
| 504 | 1 | 603 | 503 | .22727 | L | TOP PCB LAYER 6XX TO 5XX |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 505 | 1 | 604 | 504 | .90909 | L | TOP PCB LAYER 6XX TO 5XX |
| 506 | 1 | 605 | 505 | .90909 | L | TOP PCB LAYER 6XX TO 5XX |
| 507 | 1 | 606 | 506 | 1.2450 | L | TOP PCB LAYER 6XX TO 5XX |
| 508 | 1 | 607 | 507 | .75655 | L | TOP PCB LAYER 6XX TO 5XX |
| 509 | 1 | 608 | 508 | 1.03177 | L | TOP PCB LAYER 6XX TO 5XX |
| 510 | 1 | 609 | 509 | .27512 | L | TOP PCB LAYER 6XX TO 5XX |
| 511 | 1 | 610 | 510 | 1.10048 | L | TOP PCB LAYER 6XX TO 5XX |
| 512 | 1 | 611 | 511 | 1.10048 | L | TOP PCB LAYER 6XX TO 5XX |
| 513 | 1 | 612 | 512 | 1.51311 | L | TOP PCB LAYER 6XX TO 5XX |
| 514 | 1 | 613 | 513 | .02720 | L | TOP PCB LAYER 6XX TO 5XX |
| 515 | 1 | 614 | 514 | .21378 | L | TOP PCB LAYER 6XX TO 5XX |
| 516 | 1 | 615 | 515 | .21378 | L | TOP PCB LAYER 6XX TO 5XX |
| 517 | 1 | 616 | 516 | .21378 | L | TOP PCB LAYER 6XX TO 5XX |
| 518 | 1 | 617 | 517 | .21378 | L | TOP PCB LAYER 6XX TO 5XX |
| 519 | 1 | 618 | 518 | .27197 | L | TOP PCB LAYER 6XX TO 5XX |
| 520 | 1 | 619 | 519 | .35579 | L | TOP PCB LAYER 6XX TO 5XX |
| 521 | 1 | 620 | 520 | .27962 | L | TOP PCB LAYER 6XX TO 5XX |
| 522 | 1 | 621 | 521 | .27962 | L | TOP PCB LAYER 6XX TO 5XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 523 | 1 | 622 | 522 | .27962 | L | TOP PCB LAYER 6XX TO 5XX |
| 524 | 1 | 623 | 523 | .27962 | L | TOP PCB LAYER 6XX TO 5XX |
| 525 | 1 | 624 | 524 | .35579 | L | TOP PCB LAYER 6XX TO 5XX |
| 526 | 1 | 625 | 525 | .29301 | L | TOP PCB LAYER 6XX TO 5XX |
| 527 | 1 | 626 | 526 | .23024 | L | TOP PCB LAYER 6XX TO 5XX |
| 528 | 1 | 627 | 527 | .23024 | L | TOP PCB LAYER 6XX TO 5XX |
| 529 | 1 | 628 | 528 | .23024 | L | TOP PCB LAYER 6XX TO 5XX |
| 530 | 1 | 629 | 529 | .23024 | L | TOP PCB LAYER 6XX TO 5XX |
| 531 | 1 | 630 | 530 | .29301 | L | TOP PCB LAYER 6XX TO 5XX |
| 532 | 1 | 501 | 401 | .62509 | L | TOP PCB LAYER 5XX TO 4XX |
| 533 | 1 | 502 | 402 | .85227 | L | TOP PCB LAYER 5XX TO 4XX |
| 534 | 1 | 503 | 403 | .22727 | L | TOP PCB LAYER 5XX TO 4XX |
| 535 | 1 | 504 | 404 | .90909 | L | TOP PCB LAYER 5XX TO 4XX |
| 536 | 1 | 505 | 405 | .90909 | L | TOP PCB LAYER 5XX TO 4XX |
| 537 | 1 | 506 | 406 | 1.25 | L | TOP PCB LAYER 5XX TO 4XX |
| 538 | 1 | 507 | 407 | .75655 | L | TOP PCB LAYER 5XX TO 4XX |
| 539 | 1 | 508 | 408 | 1.03177 | L | TOP PCB LAYER 5XX TO 4XX |
| 540 | 1 | 509 | 409 | .27512 | L | TOP PCB LAYER 5XX TO 4XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 541 | 1 | 510 | 410 | 1.10047 | L | TOP PCB LAYER 5XX TO 4XX |
| 542 | 1 | 511 | 411 | 1.10047 | L | TOP PCB LAYER 5XX TO 4XX |
| 543 | 1 | 512 | 412 | 1.51311 | L | TOP PCB LAYER 5XX TO 4XX |
| 544 | 1 | 513 | 413 | .27196 | L | TOP PCB LAYER 5XX TO 4XX |
| 545 | 1 | 514 | 414 | .21378 | L | TOP PCB LAYER 5XX TO 4XX |
| 546 | 1 | 515 | 415 | .21378 | L | TOP PCB LAYER 5XX TO 4XX |
| 547 | 1 | 516 | 416 | .21378 | L | TOP PCB LAYER 5XX TO 4XX |
| 548 | 1 | 517 | 417 | .21378 | L | TOP PCB LAYER 5XX TO 4XX |
| 549 | 1 | 518 | 418 | .27196 | L | TOP PCB LAYER 5XX TO 4XX |
| 550 | 1 | 519 | 419 | .35579 | L | TOP PCB LAYER 5XX TO 4XX |
| 551 | 1 | 520 | 420 | .27962 | L | TOP PCB LAYER 5XX TO 4XX |
| 552 | 1 | 521 | 421 | .27962 | L | TOP PCB LAYER 5XX TO 4XX |
| 553 | 1 | 522 | 422 | .27962 | L | TOP PCB LAYER 5XX TO 4XX |
| 554 | 1 | 523 | 423 | .27962 | L | TOP PCB LAYER 5XX TO 4XX |
| 555 | 1 | 524 | 424 | .35579 | L | TOP PCB LAYER 5XX TO 4XX |
| 556 | 1 | 525 | 425 | .29301 | L | TOP PCB LAYER 5XX TO 4XX |
| 557 | 1 | 526 | 426 | .23024 | L | TOP PCB LAYER 5XX TO 4XX |
| 558 | 1 | 527 | 427 | .23024 | L | TOP PCB LAYER 5XX TO 4XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 559 | 1 | 528 | 428 | .23024 | L | TOP PCB LAYER 5XX TO 4XX |
| 560 | 1 | 529 | 429 | .23024 | L | TOP PCB LAYER 5XX TO 4XX |
| 561 | 1 | 530 | 430 | .29301 | L | TOP PCB LAYER 5XX TO 4XX |
| 562 | 1 | 401 | 301 | .625 | L | TOP PCB LAYER 4XX TO 3XX |
| 563 | 1 | 402 | 302 | .85227 | L | TOP PCB LAYER 4XX TO 3XX |
| 564 | 1 | 403 | 303 | .22727 | L | TOP PCB LAYER 4XX TO 3XX |
| 565 | 1 | 404 | 304 | .90909 | L | TOP PCB LAYER 4XX TO 3XX |
| 566 | 1 | 405 | 305 | .90909 | L | TOP PCB LAYER 4XX TO 3XX |
| 567 | 1 | 406 | 306 | 1.25 | L | TOP PCB LAYER 4XX TO 3XX |
| 568 | 1 | 407 | 307 | .75655 | L | TOP PCB LAYER 4XX TO 3XX |
| 569 | 1 | 408 | 308 | 1.03177 | L | TOP PCB LAYER 4XX TO 3XX |
| 570 | 1 | 409 | 309 | .27512 | L | TOP PCB LAYER 4XX TO 3XX |
| 571 | 1 | 410 | 310 | 1.10048 | L | TOP PCB LAYER 4XX TO 3XX |
| 572 | 1 | 411 | 311 | 1.10048 | L | TOP PCB LAYER 4XX TO 3XX |
| 573 | 1 | 412 | 312 | 1.51311 | L | TOP PCB LAYER 4XX TO 3XX |
| 574 | 1 | 413 | 313 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 575 | 1 | 414 | 314 | .21378 | L | TOP PCB LAYER 4XX TO 3XX |
| 576 | 1 | 415 | 315 | .21378 | L | TOP PCB LAYER 4XX TO 3XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 577 | 1 | 416 | 316 | .21378 | L | TOP PCB LAYER 4XX TO 3XX |
| 578 | 1 | 417 | 317 | .21378 | L | TOP PCB LAYER 4XX TO 3XX |
| 579 | 1 | 418 | 318 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 580 | 1 | 419 | 319 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 581 | 1 | 420 | 320 | .35579 | L | TOP PCB LAYER 4XX TO 3XX |
| 582 | 1 | 421 | 321 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 583 | 1 | 422 | 322 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 584 | 1 | 423 | 323 | .27196 | L | TOP PCB LAYER 4XX TO 3XX |
| 585 | 1 | 424 | 324 | .90909 | L | TOP PCB LAYER 4XX TO 3XX |
| 586 | 1 | 425 | 325 | .35579 | L | TOP PCB LAYER 4XX TO 3XX |
| 587 | 1 | 426 | 326 | .29301 | L | TOP PCB LAYER 4XX TO 3XX |
| 588 | 1 | 427 | 327 | .23024 | L | TOP PCB LAYER 4XX TO 3XX |
| 589 | 1 | 428 | 328 | .23024 | L | TOP PCB LAYER 4XX TO 3XX |
| 590 | 1 | 429 | 329 | .23024 | L | TOP PCB LAYER 4XX TO 3XX |
| 591 | 1 | 430 | 330 | .29301 | L | TOP PCB LAYER 4XX TO 3XX |
| 592 | 1 | 301 | 201 | .625 | L | TOP PCB LAYER 3XX TO 2XX |
| 593 | 1 | 302 | 202 | .85227 | L | TOP PCB LAYER 3XX TO 2XX |
| 594 | 1 | 303 | 203 | .22727 | L | TOP PCB LAYER 3XX TO 2XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 595 | 1 | 304 | 204 | .90909 | L | TOP PCB LAYER 3XX TO 2XX |
| 596 | 1 | 305 | 205 | .90909 | L | TOP PCB LAYER 3XX TO 2XX |
| 597 | 1 | 306 | 206 | 1.25 | L | TOP PCB LAYER 3XX TO 2XX |
| 598 | 1 | 307 | 207 | .75655 | L | TOP PCB LAYER 3XX TO 2XX |
| 599 | 1 | 308 | 208 | 1.03177 | L | TOP PCB LAYER 3XX TO 2XX |
| 600 | 1 | 309 | 209 | .27512 | L | TOP PCB LAYER 3XX TO 2XX |
| 601 | 1 | 310 | 210 | 1.10048 | L | TOP PCB LAYER 3XX TO 2XX |
| 602 | 1 | 311 | 211 | 1.10048 | L | TOP PCB LAYER 3XX TO 2XX |
| 603 | 1 | 312 | 212 | 1.51311 | L | TOP PCB LAYER 3XX TO 2XX |
| 604 | 1 | 313 | 213 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |
| 605 | 1 | 314 | 214 | .21378 | L | TOP PCB LAYER 3XX TO 2XX |
| 606 | 1 | 315 | 215 | .21378 | L | TOP PCB LAYER 3XX TO 2XX |
| 607 | 1 | 316 | 216 | .21378 | L | TOP PCB LAYER 3XX TO 2XX |
| 608 | 1 | 317 | 217 | .21378 | L | TOP PCB LAYER 3XX TO 2XX |
| 609 | 1 | 318 | 218 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |
| 610 | 1 | 319 | 219 | .35559 | L | TOP PCB LAYER 3XX TO 2XX |
| 611 | 1 | 320 | 220 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |
| 612 | 1 | 321 | 221 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 613 | 1 | 322 | 222 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |
| 614 | 1 | 323 | 223 | .27196 | L | TOP PCB LAYER 3XX TO 2XX |
| 615 | 1 | 324 | 224 | .35579 | L | TOP PCB LAYER 3XX TO 2XX |
| 616 | 1 | 325 | 225 | .29301 | L | TOP PCB LAYER 3XX TO 2XX |
| 617 | 1 | 326 | 226 | .23024 | L | TOP PCB LAYER 3XX TO 2XX |
| 618 | 1 | 327 | 227 | .23024 | L | TOP PCB LAYER 3XX TO 2XX |
| 619 | 1 | 328 | 228 | .23024 | L | TOP PCB LAYER 3XX TO 2XX |
| 620 | 1 | 329 | 229 | .23024 | L | TOP PCB LAYER 3XX TO 2XX |
| 621 | 1 | 330 | 230 | .29301 | L | TOP PCB LAYER 3XX TO 2XX |
| 622 | 1 | 201 | 101 | .625 | L | TOP PCB LAYER 2XX TO1XX |
| 623 | 1 | 202 | 102 | .85227 | L | TOP PCB LAYER 2XX TO1XX |
| 624 | 1 | 203 | 103 | .22727 | L | TOP PCB LAYER 2XX TO1XX |
| 625 | 1 | 204 | 104 | .90909 | L | TOP PCB LAYER 2XX TO1XX |
| 626 | 1 | 205 | 105 | .90909 | L | TOP PCB LAYER 2XX TO1XX |
| 627 | 1 | 206 | 106 | 1.25 | L | TOP PCB LAYER 2XX TO1XX |
| 628 | 1 | 207 | 107 | .75655 | L | TOP PCB LAYER 2XX TO1XX |
| 629 | 1 | 208 | 108 | 1.03177 | L | TOP PCB LAYER 2XX TO1XX |
| 630 | 1 | 209 | 109 | .27512 | L | TOP PCB LAYER 2XX TO1XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 631 | 1 | 210 | 110 | 1.10048 | L | TOP PCB LAYER 2XX TO1XX |
| 632 | 1 | 211 | 111 | 1.10048 | L | TOP PCB LAYER 2XX TO1XX |
| 633 | 1 | 212 | 112 | 1.51311 | L | TOP PCB LAYER 2XX TO1XX |
| 634 | 1 | 213 | 113 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 635 | 1 | 214 | 114 | .21378 | L | TOP PCB LAYER 2XX TO1XX |
| 636 | 1 | 215 | 115 | .21378 | L | TOP PCB LAYER 2XX TO1XX |
| 637 | 1 | 216 | 116 | .21378 | L | TOP PCB LAYER 2XX TO1XX |
| 638 | 1 | 217 | 117 | .21378 | L | TOP PCB LAYER 2XX TO1XX |
| 639 | 1 | 218 | 118 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 640 | 1 | 219 | 119 | .35579 | L | TOP PCB LAYER 2XX TO1XX |
| 641 | 1 | 220 | 120 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 642 | 1 | 221 | 121 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 643 | 1 | 222 | 122 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 644 | 1 | 223 | 123 | .27196 | L | TOP PCB LAYER 2XX TO1XX |
| 645 | 1 | 224 | 124 | .35579 | L | TOP PCB LAYER 2XX TO1XX |
| 646 | 1 | 225 | 125 | .29301 | L | TOP PCB LAYER 2XX TO1XX |
| 647 | 1 | 226 | 126 | .23024 | L | TOP PCB LAYER 2XX TO1XX |
| 648 | 1 | 227 | 127 | .23024 | L | TOP PCB LAYER 2XX TO1XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 649 | 1 | 228 | 128 | .23024 | L | TOP PCB LAYER 2XX TO1XX |
| 650 | 1 | 229 | 129 | .23024 | L | TOP PCB LAYER 2XX TO1XX |
| 651 | 1 | 230 | 130 | .29301 | L | TOP PCB LAYER 2XX TO1XX |
| 652 | 1 | 1601 | 1602 | .0006276 | L | BOTTOM PCB THERMAL LYR NODE-NODE |
| 653 | 1 | 1601 | 1607 | .0003138 | L | |
| 654 | 1 | 1601 | 1614 | .0007322 | L | |
| 655 | 1 | 1602 | 1603 | .0005983 | L | |
| 656 | 1 | 1602 | 1607 | .0002613 | L | |
| 657 | 1 | 1603 | 1604 | .0006597 | L | |
| 658 | 1 | 1603 | 1608 | .0001342 | L | |
| 659 | 1 | 1604 | 1605 | .0008874 | L | |
| 660 | 1 | 1604 | 1609 | .0000524 | L | |
| 661 | 1 | 1604 | 1610 | .0000444 | L | |
| 662 | 1 | 1604 | 1611 | .0000560 | L | |
| 663 | 1 | 1605 | 1606 | .000536 | L | |
| 664 | 1 | 1605 | 1612 | .0000524 | L | |
| 665 | 1 | 1606 | 1617 | .0004594 | L | |
| 666 | 1 | 1606 | 1613 | .0002978 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 667 | 1 | 1607 | 1608 | .0002992 | L | BOTTOM PCB THERMAL LYR NODE-NODE |
| 668 | 1 | 1607 | 1614 | .0001861 | L | |
| 669 | 1 | 1608 | 1609 | .0002780 | L | |
| 670 | 1 | 1608 | 1615 | .0001340 | L | |
| 671 | 1 | 1609 | 1610 | .0009901 | L | |
| 672 | 1 | 1609 | 1615 | .0000524 | L | |
| 673 | 1 | 1610 | 1611 | .0009178 | L | |
| 674 | 1 | 1610 | 1615 | .0000444 | L | |
| 675 | 1 | 1611 | 1612 | .000804 | L | |
| 676 | 1 | 1611 | 1615 | .0000560 | L | |
| 677 | 1 | 1612 | 1613 | .000268 | L | |
| 678 | 1 | 1612 | 1616 | .0000596 | L | |
| 679 | 1 | 1613 | 1617 | .0003829 | L | |
| 680 | 1 | 1613 | 1616 | .0003752 | L | |
| 681 | 1 | 1614 | 1615 | .000469 | L | |
| 682 | 1 | 1615 | 1616 | .0003450 | L | |
| 683 | 1 | 1616 | 1617 | .000469 | L | |
| 684 | 1 | 1501 | 1502 | .009055 | L | BOTTOM PCB BTM POLY LYR NODE-NODE |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 685 | 1 | 1501 | 1507 | .004528 | L | BOTTOM PCB BTM POLY LYR NODE-NODE |
| 686 | 1 | 1501 | 1514 | .010570 | L | |
| 687 | 1 | 1502 | 1503 | .008631 | L | |
| 688 | 1 | 1502 | 1507 | .002684 | L | |
| 689 | 1 | 1503 | 1504 | .009516 | L | |
| 690 | 1 | 1503 | 1508 | .001929 | L | |
| 691 | 1 | 1504 | 1505 | .01280 | L | |
| 692 | 1 | 1504 | 1509 | .000752 | L | |
| 693 | 1 | 1504 | 1510 | .000644 | L | |
| 694 | 1 | 1504 | 1511 | .000860 | L | |
| 695 | 1 | 1505 | 1506 | .007733 | L | |
| 696 | 1 | 1505 | 1512 | .000860 | L | |
| 697 | 1 | 1506 | 1517 | .006629 | L | |
| 698 | 1 | 1506 | 1513 | .004293 | L | |
| 699 | 1 | 1507 | 1508 | .004315 | L | |
| 700 | 1 | 1507 | 1514 | .002416 | L | |
| 701 | 1 | 1508 | 1509 | .004033 | L | |
| 702 | 1 | 1508 | 1515 | .00232 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 703 | 1 | 1509 | 1510 | .01429 | L | BOTTOM PCB BTM POLY LYR NODE-NODE |
| 704 | 1 | 1509 | 1515 | .000691 | L | |
| 705 | 1 | 1510 | 1511 | .01324 | L | |
| 706 | 1 | 1510 | 1515 | .00058 | L | |
| 707 | 1 | 1511 | 1512 | .0116 | L | |
| 708 | 1 | 1511 | 1515 | .000774 | L | |
| 709 | 1 | 1512 | 1513 | .003867 | L | |
| 710 | 1 | 1512 | 1516 | .000774 | L | |
| 711 | 1 | 1513 | 1517 | .003314 | L | |
| 712 | 1 | 1513 | 1516 | .003864 | L | |
| 713 | 1 | 1514 | 1515 | .00677 | L | |
| 714 | 1 | 1515 | 1516 | .004980 | L | |
| 715 | 1 | 1516 | 1517 | .00677 | L | |
| 716 | 1 | 1401 | 1402 | .000628 | L | BOTTOM PCB GRND LYR NODE-NODE |
| 717 | 1 | 1401 | 1407 | .000314 | L | |
| 718 | 1 | 1401 | 1414 | .000732 | L | |
| 719 | 1 | 1402 | 1403 | .000598 | L | |
| 720 | 1 | 1402 | 1407 | .000261 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 721 | 1 | 1403 | 1404 | .0006597 | L | BOTTOM PCB GRND LYR NODE-NODE |
| 722 | 1 | 1403 | 1408 | .0001342 | L | |
| 723 | 1 | 1404 | 1405 | .0008874 | L | |
| 724 | 1 | 1404 | 1409 | .0000524 | L | |
| 725 | 1 | 1404 | 1410 | .0000444 | L | |
| 726 | 1 | 1404 | 1411 | .0000596 | L | |
| 727 | 1 | 1405 | 1406 | .0005366 | L | |
| 728 | 1 | 1405 | 1412 | .0000524 | L | |
| 729 | 1 | 1406 | 1417 | .0004594 | L | |
| 730 | 1 | 1406 | 1413 | .0002978 | L | |
| 731 | 1 | 1407 | 1408 | .0002991 | L | |
| 732 | 1 | 1407 | 1414 | .0001861 | L | |
| 733 | 1 | 1408 | 1409 | .0002796 | L | |
| 734 | 1 | 1408 | 1415 | .0001340 | L | |
| 735 | 1 | 1409 | 1410 | .0009901 | L | |
| 736 | 1 | 1409 | 1415 | .0000524 | L | |
| 737 | 1 | 1410 | 1411 | .0009178 | L | |
| 738 | 1 | 1410 | 1415 | .0000444 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 739 | 1 | 1411 | 1412 | .000804 | L | BOTTOM PCB GRND LYR NODE-NODE |
| 740 | 1 | 1411 | 1415 | .0000596 | L | |
| 741 | 1 | 1412 | 1413 | .000268 | L | |
| 742 | 1 | 1412 | 1416 | .0000596 | L | |
| 743 | 1 | 1413 | 1417 | .0003829 | L | |
| 744 | 1 | 1413 | 1416 | .0003752 | L | |
| 745 | 1 | 1414 | 1415 | .000469 | L | |
| 746 | 1 | 1415 | 1416 | .0003450 | L | |
| 747 | 1 | 1416 | 1417 | .000469 | L | |
| 748 | 1 | 1301 | 1302 | .009055 | L | |
| 749 | 1 | 1301 | 1307 | .004528 | L | BOTTOM PCB MID POLY LYR NODE-NODE |
| 750 | 1 | 1301 | 1314 | .01060 | L | |
| 751 | 1 | 1302 | 1303 | .00863 | L | |
| 752 | 1 | 1302 | 1307 | .002684 | L | |
| 753 | 1 | 1303 | 1304 | .009516 | L | |
| 754 | 1 | 1303 | 1308 | .001929 | L | |
| 755 | 1 | 1304 | 1305 | .01280 | L | |
| 756 | 1 | 1304 | 1309 | .000752 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 757 | 1 | 1304 | 1310 | .000644 | L | BOTTOM PCB MID POLY LYR NODE-NODE |
| 758 | 1 | 1304 | 1311 | .000860 | L | |
| 759 | 1 | 1305 | 1306 | .007733 | L | |
| 760 | 1 | 1305 | 1312 | .000860 | L | |
| 761 | 1 | 1306 | 1317 | .006629 | L | |
| 762 | 1 | 1306 | 1313 | .004293 | L | |
| 763 | 1 | 1307 | 1308 | .004315 | L | |
| 764 | 1 | 1307 | 1314 | .002416 | L | |
| 765 | 1 | 1308 | 1309 | .004033 | L | |
| 766 | 1 | 1308 | 1315 | .00232 | L | |
| 767 | 1 | 1309 | 1310 | .01439 | L | |
| 768 | 1 | 1309 | 1315 | .000691 | L | |
| 769 | 1 | 1310 | 1311 | .01324 | L | |
| 770 | 1 | 1310 | 1315 | .00058 | L | |
| 771 | 1 | 1311 | 1312 | .0116 | L | |
| 772 | 1 | 1311 | 1315 | .000774 | L | |
| 773 | 1 | 1312 | 1313 | .003867 | L | |
| 774 | 1 | 1312 | 1316 | .000774 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 775 | 1 | 1313 | 1317 | .003314 | L | BOTTOM PCB MID POLY LYR NODE-NODE |
| 776 | 1 | 1313 | 1316 | .003864 | L | |
| 777 | 1 | 1314 | 1315 | .00677 | L | |
| 778 | 1 | 1315 | 1316 | .004980 | L | |
| 779 | 1 | 1316 | 1317 | .00677 | L | |
| 780 | 1 | 1201 | 1202 | .0006276 | L | BOTTOM PCB TOP Cu LYR NODE-NODE |
| 781 | 1 | 1201 | 1207 | .0003138 | L | |
| 782 | 1 | 1201 | 1214 | .0007322 | L | |
| 783 | 1 | 1202 | 1203 | .0005983 | L | |
| 784 | 1 | 1202 | 1207 | .0002613 | L | |
| 785 | 1 | 1203 | 1204 | .0006597 | L | |
| 786 | 1 | 1203 | 1208 | .0001342 | L | |
| 787 | 1 | 1204 | 1205 | .0008874 | L | |
| 788 | 1 | 1204 | 1209 | .0000524 | L | |
| 789 | 1 | 1204 | 1210 | .0000444 | L | |
| 790 | 1 | 1204 | 1211 | .0000596 | L | |
| 791 | 1 | 1205 | 1206 | .000536 | L | |
| 792 | 1 | 1205 | 1212 | .0000524 | L | |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 793 | 1 | 1206 | 1217 | .0004594 | L | BOTTOM PCB TOP Cu LYR NODE-NODE |
| 794 | 1 | 1206 | 1213 | .0002978 | L | |
| 795 | 1 | 1207 | 1208 | .0002992 | L | |
| 796 | 1 | 1207 | 1214 | .0001861 | L | |
| 797 | 1 | 1208 | 1209 | .0002796 | L | |
| 798 | 1 | 1208 | 1215 | .0001340 | L | |
| 799 | 1 | 1209 | 1210 | .0009901 | L | |
| 800 | 1 | 1209 | 1215 | .0000524 | L | |
| 801 | 1 | 1210 | 1211 | .0009178 | L | |
| 802 | 1 | 1210 | 1215 | .0000444 | L | |
| 803 | 1 | 1211 | 1212 | .000804 | L | |
| 804 | 1 | 1211 | 1215 | .0000596 | L | |
| 805 | 1 | 1212 | 1213 | .000268 | L | |
| 806 | 1 | 1212 | 1216 | .0000596 | L | |
| 807 | 1 | 1213 | 1217 | .0003829 | L | |
| 808 | 1 | 1213 | 1216 | .0003752 | L | |
| 809 | 1 | 1214 | 1215 | .000469 | L | |
| 810 | 1 | 1215 | 1216 | .0003450 | L | |

```
CTRL-FlImport ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
       FlSave/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 811 | 1 | 1216 | 1217 | .000469 | L | BOTTOM PCB TOP Cu LYR NODE-NODE |
| 812 | 1 | 1101 | 1102 | .009055 | L | BOTTOM PCB TOP POLY LYR NODE-NODE |
| 813 | 1 | 1101 | 1107 | .004528 | L | |
| 814 | 1 | 1101 | 1114 | .010570 | L | |
| 815 | 1 | 1102 | 1103 | .008631 | L | |
| 816 | 1 | 1102 | 1107 | .002684 | L | |
| 817 | 1 | 1103 | 1104 | .009516 | L | |
| 818 | 1 | 1103 | 1108 | .001929 | L | |
| 819 | 1 | 1104 | 1105 | .012804 | L | |
| 820 | 1 | 1104 | 1109 | .000752 | L | |
| 821 | 1 | 1104 | 1110 | .000644 | L | |
| 822 | 1 | 1104 | 1111 | .0008596 | L | |
| 823 | 1 | 1105 | 1106 | .007733 | L | |
| 824 | 1 | 1105 | 1112 | .0008596 | L | |
| 825 | 1 | 1106 | 1117 | .006629 | L | |
| 826 | 1 | 1106 | 1113 | .004293 | L | |
| 827 | 1 | 1107 | 1108 | .004315 | L | |
| 828 | 1 | 1107 | 1114 | .002416 | L | |

```
CTRL-FlImport ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
       FlSave/Purge      F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 829  | 1 | 1108 | 1109 | .004033 | L | BOTTOM PCB TOP POLY LYR NODE-NODE |
| 830  | 1 | 1108 | 1115 | .00232  | L | |
| 831  | 1 | 1109 | 1110 | .01429  | L | |
| 832  | 1 | 1109 | 1115 | .000691 | L | |
| 833  | 1 | 1110 | 1111 | .013242 | L | |
| 834  | 1 | 1110 | 1115 | .00058  | L | |
| 835  | 1 | 1111 | 1112 | .0116   | L | |
| 836  | 1 | 1111 | 1115 | .000774 | L | |
| 837  | 1 | 1112 | 1113 | .003867 | L | |
| 838  | 1 | 1112 | 1116 | .000774 | L | |
| 839  | 1 | 1113 | 1117 | .003314 | L | |
| 840  | 1 | 1113 | 1116 | .003864 | L | |
| 841  | 1 | 1114 | 1115 | .00677  | L | |
| 842  | 1 | 1115 | 1116 | .004980 | L | |
| 843  | 1 | 1116 | 1117 | .00677  | L | |
| 844  | 1 | 1601 | 1501 | 1.53206 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 845  | 1 | 1602 | 1502 | .89779  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 846  | 1 | 1603 | 1503 | .64634  | L | BOTTOM PCB LAYER 16XX TO 15XX |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                     End
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 847  | 1 | 1604 | 1504 | .75416  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 848  | 1 | 1605 | 1505 | .28726  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 849  | 1 | 1606 | 1506 | 1.43631 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 850  | 1 | 1607 | 1507 | .44889  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 851  | 1 | 1608 | 1508 | .323276 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 852  | 1 | 1609 | 1509 | .12517  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 853  | 1 | 1610 | 1510 | .10763  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 854  | 1 | 1611 | 1511 | .14363  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 855  | 1 | 1612 | 1512 | .14363  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 856  | 1 | 1613 | 1513 | .71815  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 857  | 1 | 1614 | 1514 | 1.04774 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 858  | 1 | 1615 | 1515 | 1.63375 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 859  | 1 | 1616 | 1516 | 2.0108  | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 860  | 1 | 1617 | 1517 | 1.53206 | L | BOTTOM PCB LAYER 16XX TO 15XX |
| 861  | 1 | 1501 | 1401 | 1.53206 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 862  | 1 | 1502 | 1402 | .89779  | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 863  | 1 | 1503 | 1403 | .64634  | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 864  | 1 | 1504 | 1404 | .75416  | L | BOTTOM PCB LAYER 15XX TO 14XX |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                     End
      F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 865 | 1 | 1505 | 1405 | .28726 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 866 | 1 | 1506 | 1406 | 1.43631 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 867 | 1 | 1507 | 1407 | .44889 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 868 | 1 | 1508 | 1408 | .32327 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 869 | 1 | 1509 | 1409 | .12517 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 870 | 1 | 1510 | 1410 | .10763 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 871 | 1 | 1511 | 1411 | .14363 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 872 | 1 | 1512 | 1412 | .14363 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 873 | 1 | 1513 | 1413 | .71815 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 874 | 1 | 1514 | 1414 | 1.04774 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 875 | 1 | 1515 | 1415 | 1.63375 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 876 | 1 | 1516 | 1416 | 2.01083 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 877 | 1 | 1517 | 1417 | 1.53206 | L | BOTTOM PCB LAYER 15XX TO 14XX |
| 878 | 1 | 1401 | 1301 | 1.53206 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 879 | 1 | 1402 | 1302 | .89779 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 880 | 1 | 1403 | 1303 | .64634 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 881 | 1 | 1404 | 1304 | .75416 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 882 | 1 | 1405 | 1305 | .28726 | L | BOTTOM PCB LAYER 14XX TO13XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 883 | 1 | 1406 | 1306 | 1.43631 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 884 | 1 | 1407 | 1307 | .44889 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 885 | 1 | 1408 | 1308 | .32327 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 886 | 1 | 1409 | 1309 | .12517 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 887 | 1 | 1410 | 1310 | .10763 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 888 | 1 | 1411 | 1311 | .14363 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 889 | 1 | 1412 | 1312 | .14363 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 890 | 1 | 1413 | 1313 | .71815 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 891 | 1 | 1414 | 1314 | 1.04774 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 892 | 1 | 1415 | 1315 | 1.63375 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 893 | 1 | 1416 | 1316 | 2.01083 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 894 | 1 | 1417 | 1317 | 1.53206 | L | BOTTOM PCB LAYER 14XX TO13XX |
| 895 | 1 | 1301 | 1201 | 1.53206 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 896 | 1 | 1302 | 1202 | .89779 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 897 | 1 | 1303 | 1203 | .64634 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 898 | 1 | 1304 | 1204 | .75416 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 899 | 1 | 1305 | 1205 | .28726 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 900 | 1 | 1306 | 1206 | 1.43631 | L | BOTTOM PCB LAYER 13XX TO 12XX |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 901 | 1 | 1307 | 1207 | .44889 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 902 | 1 | 1308 | 1208 | .32327 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 903 | 1 | 1309 | 1209 | .12517 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 904 | 1 | 1310 | 1210 | .10763 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 905 | 1 | 1311 | 1211 | .14363 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 906 | 1 | 1312 | 1212 | .14363 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 907 | 1 | 1313 | 1213 | .71815 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 908 | 1 | 1314 | 1214 | 1.04774 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 909 | 1 | 1315 | 1215 | 1.63375 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 910 | 1 | 1316 | 1216 | 2.01083 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 911 | 1 | 1317 | 1217 | 1.53206 | L | BOTTOM PCB LAYER 13XX TO 12XX |
| 912 | 1 | 1201 | 1101 | 1.53206 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 913 | 1 | 1202 | 1102 | .89779 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 914 | 1 | 1203 | 1103 | .64634 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 915 | 1 | 1204 | 1104 | .75416 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 916 | 1 | 1205 | 1105 | .28726 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 917 | 1 | 1206 | 1106 | 1.43631 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 918 | 1 | 1207 | 1107 | .44889 | L | BOTTOM PCB LAYER 12XX TO11XX |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed    PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur    End
    F1Save/Purge    F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 919 | 1 | 1208 | 1108 | .32327 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 920 | 1 | 1209 | 1109 | .12517 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 921 | 1 | 1210 | 1110 | .10763 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 922 | 1 | 1211 | 1111 | .14363 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 923 | 1 | 1212 | 1112 | .14363 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 924 | 1 | 1213 | 1113 | .71815 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 925 | 1 | 1214 | 1114 | 1.04774 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 926 | 1 | 1215 | 1115 | 1.63375 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 927 | 1 | 1216 | 1116 | 2.01083 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 928 | 1 | 1217 | 1117 | 1.53206 | L | BOTTOM PCB LAYER 12XX TO11XX |
| 929 | 1 | 2011 | 101 | .000296 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 930 | 1 | 2012 | 201 | .000197 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 931 | 1 | 2013 | 301 | .000296 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 932 | 1 | 2014 | 401 | .000176 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 933 | 1 | 2015 | 501 | .000296 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 934 | 1 | 2016 | 601 | .000197 | L | EQUIV PIN CONDUCTANCE 3.01 |
| 935 | 1 | 2021 | 102 | .000296 | L | EQUIV CONDUCTANCE FOR 3.02 |
| 936 | 1 | 2022 | 202 | .000197 | L | EQUIV CONDUCTANCE FOR 3.02 |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed    PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur    End
    F1Save/Purge    F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 937 | 1 | 2023 | 302 | .000296 | L | EQUIV CONDUCTANCE FOR 3.02 |
| 938 | 1 | 2024 | 402 | .000197 | L | EQUIV CONDUCTANCE FOR 3.02 |
| 939 | 1 | 2025 | 502 | .000296 | L | EQUIV CONDUCTANCE FOR 3.02 |
| 940 | 1 | 2026 | 602 | .000197 | L | EQUIV CONDUCTANCE FOR 3.02 |
| 941 | 1 | 2031 | 103 | .000296 | L | EQUIV COND FOR 3.03 |
| 942 | 1 | 2032 | 203 | .000197 | L | EQUIV COND FOR 3.03 |
| 943 | 1 | 2033 | 303 | .000296 | L | EQUIV COND FOR 3.03 |
| 944 | 1 | 2034 | 403 | .000197 | L | EQUIV COND FOR 3.03 |
| 945 | 1 | 2035 | 503 | .000296 | L | EQUIV COND FOR 3.03 |
| 946 | 1 | 2036 | 603 | .000197 | L | EQUIV COND FOR 3.03 |
| 947 | 1 | 2041 | 104 | .000296 | L | EQUIV PIN COND FOR 3.04 |
| 948 | 1 | 2042 | 204 | .000198 | L | EQUIV PIN COND FOR 3.04 |
| 949 | 1 | 2043 | 304 | .000296 | L | EQUIV PIN COND FOR 3.04 |
| 950 | 1 | 2044 | 404 | .000198 | L | EQUIV PIN COND FOR 3.04 |
| 951 | 1 | 2045 | 504 | .000296 | L | EQUIV PIN COND FOR 3.04 |
| 952 | 1 | 2046 | 604 | .000198 | L | EQUIV PIN COND FOR 3.04 |
| 953 | 1 | 2051 | 105 | .000296 | L | EQUIV PIN COND FOR 3.05 |
| 954 | 1 | 2052 | 205 | .000197 | L | EQUIV PIN COND FOR 3.05 |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 955 | 1 | 2053 | 305 | .000296 | L | EQUIV PIN COND FOR 3.05 |
| 956 | 1 | 2054 | 405 | .000197 | L | EQUIV PIN COND FOR 3.05 |
| 957 | 1 | 2055 | 505 | .000296 | L | EQUIV PIN COND FOR 3.05 |
| 958 | 1 | 2056 | 605 | .000197 | L | EQUIV PIN COND FOR 3.05 |
| 959 | 1 | 2061 | 106 | .000296 | L | EQUIV PIN COND FOR 3.06 |
| 960 | 1 | 2062 | 206 | .000198 | L | EQUIV PIN COND FOR 3.06 |
| 961 | 1 | 2063 | 306 | .000296 | L | EQUIV PIN COND FOR 3.06 |
| 962 | 1 | 2064 | 406 | .000198 | L | EQUIV PIN COND FOR 3.06 |
| 963 | 1 | 2065 | 506 | .000296 | L | EQUIV PIN COND FOR 3.06 |
| 964 | 1 | 2066 | 606 | .000198 | L | EQUIV PIN COND FOR 3.06 |
| 965 | 1 | 2071 | 107 | .000296 | L | EQUIV PIN COND FOR 3.07 |
| 966 | 1 | 2072 | 207 | .000197 | L | EQUIV PIN COND FOR 3.07 |
| 967 | 1 | 2073 | 307 | .000296 | L | EQUIV PIN COND FOR 3.07 |
| 968 | 1 | 2074 | 407 | .000197 | L | EQUIV PIN COND FOR 3.07 |
| 969 | 1 | 2075 | 507 | .000296 | L | EQUIV PIN COND FOR 3.07 |
| 970 | 1 | 2076 | 607 | .000197 | L | EQUIV PIN COND FOR 3.07 |
| 971 | 1 | 2081 | 108 | .000296 | L | EQUIV PIN COND FOR 3.08 |
| 972 | 1 | 2082 | 208 | .000197 | L | EQUIV PIN COND FOR 3.08 |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 973 | 1 | 2083 | 308 | .000296 | L | EQUIV PIN COND FOR 3.08 |
| 974 | 1 | 2084 | 408 | .000197 | L | EQUIV PIN COND FOR 3.08 |
| 975 | 1 | 2085 | 508 | .000296 | L | EQUIV PIN COND FOR 3.08 |
| 976 | 1 | 2086 | 608 | .000197 | L | EQUIV PIN COND FOR 3.08 |
| 977 | 1 | 2091 | 109 | .000296 | L | EQUIV PIN COND FOR 3.09 |
| 978 | 1 | 2092 | 110 | .000197 | L | EQUIV PIN COND FOR 3.09 |
| 979 | 1 | 2093 | 111 | .000296 | L | EQUIV PIN COND FOR 3.09 |
| 980 | 1 | 2094 | 112 | .000197 | L | EQUIV PIN COND FOR 3.09 |
| 981 | 1 | 2095 | 113 | .000296 | L | EQUIV PIN COND FOR 3.09 |
| 982 | 1 | 2096 | 114 | .000197 | L | EQUIV PIN COND FOR 3.10 |
| 983 | 1 | 2101 | 110 | .000296 | L | EQUIV PIN COND FOR 3.10 |
| 984 | 1 | 2102 | 210 | .000197 | L | EQUIV PIN COND FOR 3.10 |
| 985 | 1 | 2103 | 310 | .000296 | L | EQUIV PIN COND FOR 3.10 |
| 986 | 1 | 2104 | 410 | .000197 | L | EQUIV PIN COND FOR 3.10 |
| 987 | 1 | 2105 | 510 | .000296 | L | EQUIV PIN COND FOR 3.10 |
| 988 | 1 | 2106 | 610 | .000197 | L | EQUIV PIN COND FOR 3.10 |
| 989 | 1 | 2111 | 111 | .000296 | L | EQUIV PIN COND FOR 3.11 |
| 990 | 1 | 2112 | 211 | .000197 | L | EQUIV PIN COND FOR 3.11 |

CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-F1Import Column     Shift-F3AutoCHT    Shift-F5Del/Pur                    End
        F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 991 | 1 | 2113 | 311 | .000296 | L | EQUIV PIN COND FOR 3.11 |
| 992 | 1 | 2114 | 411 | .000197 | L | EQUIV PIN COND FOR 3.11 |
| 993 | 1 | 2115 | 511 | .000296 | L | EQUIV PIN COND FOR 3.11 |
| 994 | 1 | 2116 | 611 | .000197 | L | EQUIV PIN COND FOR 3.11 |
| 995 | 1 | 2121 | 112 | .000296 | L | EQUIV PIN COND FOR 3.12 |
| 996 | 1 | 2122 | 212 | .000197 | L | EQUIV PIN COND FOR 3.12 |
| 997 | 1 | 2123 | 312 | .000296 | L | EQUIV PIN COND FOR 3.12 |
| 998 | 1 | 2124 | 412 | .000197 | L | EQUIV PIN COND FOR 3.12 |
| 999 | 1 | 2125 | 512 | .000296 | L | EQUIV PIN COND FOR 3.12 |
| 1000 | 1 | 2126 | 612 | .000197 | L | EQUIV PIN COND FOR 3.12 |
| 1001 | 1 | 2131 | 113 | .000296 | L | EQUIV PIN COND FOR 2.01 |
| 1002 | 1 | 2132 | 213 | .000197 | L | EQUIV PIN COND FOR 2.01 |
| 1003 | 1 | 2133 | 313 | .000296 | L | EQUIV PIN COND FOR 2.01 |
| 1004 | 1 | 2134 | 413 | .000197 | L | EQUIV PIN COND FOR 2.01 |
| 1005 | 1 | 2135 | 513 | .000296 | L | EQUIV PIN COND FOR 2.01 |
| 1006 | 1 | 2136 | 613 | .000197 | L | EQUIV PIN COND FOR 2.01 |
| 1007 | 1 | 2141 | 114 | .000296 | L | EQUIV PIN COND FOR 2.02 |
| 1008 | 1 | 2142 | 214 | .000197 | L | EQUIV PIN COND FOR 2.02 |

CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-F1Import Column     Shift-F3AutoCHT    Shift-F5Del/Pur                    End
        F1Save/Purge     F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

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¤                                                                      ¤
¤ SqNo FACTOR From   To    Cond. Value  L/R Description               ¤
¤ 1009 1     2143   314   .000296       L   EQUIV PIN COND FOR 2.02   ¤
¤ 1010 1     2144   414   .000197       L   EQUIV PIN COND FOR 2.02   ¤
¤ 1011 1     2145   514   .000296       L   EQUIV PIN COND FOR 2.02   ¤
¤ 1012 1     2146   614   .000197       L   EQUIV PIN COND FOR 2.02   ¤
¤ 1013 1     2151   115   .000296       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1014 1     2152   215   .000197       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1015 1     2153   315   .000296       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1016 1     2154   415   .000197       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1017 1     2155   515   .000296       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1018 1     2156   615   .000197       L   EQUIV PIN COND FOR 2.03   ¤
¤ 1019 1     2161   116   .000296       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1020 1     2162   216   .000197       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1021 1     2163   316   .000296       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1022 1     2164   416   .000197       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1023 1     2165   516   .000296       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1024 1     2166   616   .000197       L   EQUIV PIN COND FOR 2.04   ¤
¤ 1025 1     2171   117   .000296       L   EQUIV PIN COND FOR 2.05   ¤
¤ 1026 1     2172   217   .000197       L   EQUIV PIN COND FOR 2.05   ¤
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¤                                                                      ¤
¤ SqNo FACTOR From   To    Cond. Value  L/R Description               ¤
¤ 1027 1     2173   317   .000296       L   EQUIV PIN COND FOR 2.05   ¤
¤ 1028 1     2174   417   .000197       L   EQUIV PIN COND FOR 2.05   ¤
¤ 1029 1     2175   517   .000296       L   EQUIV PIN COND FOR 2.05   ¤
¤ 1030 1     2176   617   .000197       L   EQUIV PIN COND FOR 2.05   ¤
¤ 1031 1     2181   118   .000296       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1032 1     2182   218   .000197       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1033 1     2183   318   .000296       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1034 1     2184   418   .000197       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1035 1     2185   518   .000296       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1036 1     2186   618   .000197       L   EQUIV PIN COND FOR 2.06   ¤
¤ 1037 1     2191   119   .000296       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1038 1     2192   219   .000197       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1039 1     2193   319   .000296       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1040 1     2194   419   .000197       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1041 1     2195   519   .000296       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1042 1     2196   619   .000197       L   EQUIV PIN COND FOR 2.07   ¤
¤ 1043 1     2201   120   .000296       L   EQUIV PIN COND FOR 2.08   ¤
¤ 1044 1     2202   220   .000197       L   EQUIV PIN COND FOR 2.08   ¤
àëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëÿ
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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 1045 | 1 | 2203 | 320 | .000296 | L | EQUIV PIN COND FOR 2.08 |
| 1046 | 1 | 2204 | 420 | .000197 | L | EQUIV PIN COND FOR 2.08 |
| 1047 | 1 | 2205 | 520 | .000296 | L | EQUIV PIN COND FOR 2.08 |
| 1048 | 1 | 2206 | 620 | .000197 | L | EQUIV PIN COND FOR 2.08 |
| 1049 | 1 | 2211 | 121 | .000296 | L | EQUIV PIN COND FOR 2.09 |
| 1050 | 1 | 2212 | 221 | .000197 | L | EQUIV PIN COND FOR 2.09 |
| 1051 | 1 | 2213 | 321 | .000296 | L | EQUIV PIN COND FOR 2.09 |
| 1052 | 1 | 2214 | 421 | .000197 | L | EQUIV PIN COND FOR 2.09 |
| 1053 | 1 | 2215 | 521 | .000296 | L | EQUIV PIN COND FOR 2.09 |
| 1054 | 1 | 2216 | 621 | .000197 | L | EQUIV PIN COND FOR 2.10 |
| 1055 | 1 | 2221 | 122 | .000296 | L | EQUIV PIN COND FOR 2.10 |
| 1056 | 1 | 2222 | 222 | .000197 | L | EQUIV PIN COND FOR 2.10 |
| 1057 | 1 | 2223 | 322 | .000296 | L | EQUIV PIN COND FOR 2.10 |
| 1058 | 1 | 2224 | 422 | .000197 | L | EQUIV PIN COND FOR 2.10 |
| 1059 | 1 | 2225 | 522 | .000296 | L | EQUIV PIN COND FOR 2.10 |
| 1060 | 1 | 2226 | 622 | .000197 | L | EQUIV PIN COND FOR 2.11 |
| 1061 | 1 | 2231 | 123 | .000296 | L | EQUIV PIN COND FOR 2.11 |
| 1062 | 1 | 2232 | 223 | .000197 | L | EQUIV PIN COND FOR 2.11 |

CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                    PgDn PgUp Home
SHFT-FlImport Column     Shift-F3AutoCHT    Shift-F5Del/Pur                         End
        FlSave/Purge       F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 1063 | 1 | 2233 | 323 | .000296 | L | EQUIV PIN COND FOR 2.11 |
| 1064 | 1 | 2234 | 423 | .000197 | L | EQUIV PIN COND FOR 2.11 |
| 1065 | 1 | 2235 | 523 | .000296 | L | EQUIV PIN COND FOR 2.11 |
| 1066 | 1 | 2236 | 623 | .000197 | L | EQUIV PIN COND FOR 2.11 |
| 1067 | 1 | 2241 | 124 | .000296 | L | EQUIV PIN COND FOR 2.12 |
| 1068 | 1 | 2242 | 224 | .000197 | L | EQUIV PIN COND FOR 2.12 |
| 1069 | 1 | 2243 | 324 | .000296 | L | EQUIV PIN COND FOR 2.12 |
| 1070 | 1 | 2244 | 424 | .000197 | L | EQUIV PIN COND FOR 2.12 |
| 1071 | 1 | 2245 | 524 | .000296 | L | EQUIV PIN COND FOR 2.12 |
| 1072 | 1 | 2246 | 624 | .000197 | L | EQUIV PIN COND FOR 2.12 |
| 1073 | 1 | 2251 | 125 | .000296 | L | EQUIV PIN COND FOR 2.13 |
| 1074 | 1 | 2252 | 225 | .000197 | L | EQUIV PIN COND FOR 2.13 |
| 1075 | 1 | 2253 | 325 | .000296 | L | EQUIV PIN COND FOR 2.13 |
| 1076 | 1 | 2254 | 425 | .000197 | L | EQUIV PIN COND FOR 2.13 |
| 1077 | 1 | 2255 | 525 | .000296 | L | EQUIV PIN COND FOR 2.13 |
| 1078 | 1 | 2256 | 625 | .000197 | L | EQUIV PIN COND FOR 2.14 |
| 1079 | 1 | 2261 | 126 | .000296 | L | EQUIV PIN COND FOR 2.14 |
| 1080 | 1 | 2262 | 226 | .000197 | L | EQUIV PIN COND FOR 2.14 |

CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                    PgDn PgUp Home
SHFT-FlImport Column     Shift-F3AutoCHT    Shift-F5Del/Pur                         End
        FlSave/Purge       F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 1081 | 1 | 2263 | 326 | .000296 | L | EQUIV PIN COND FOR 2.14 |
| 1082 | 1 | 2264 | 426 | .000197 | L | EQUIV PIN COND FOR 2.14 |
| 1083 | 1 | 2265 | 526 | .000296 | L | EQUIV PIN COND FOR 2.14 |
| 1084 | 1 | 2266 | 626 | .000197 | L | EQUIV PIN COND FOR 2.14 |
| 1085 | 1 | 2271 | 127 | .000296 | L | EQUIV PIN COND FOR 2.15 |
| 1086 | 1 | 2272 | 227 | .000197 | L | EQUIV PIN COND FOR 2.15 |
| 1087 | 1 | 2273 | 327 | .000296 | L | EQUIV PIN COND FOR 2.15 |
| 1088 | 1 | 2274 | 427 | .000197 | L | EQUIV PIN COND FOR 2.15 |
| 1089 | 1 | 2275 | 527 | .000296 | L | EQUIV PIN COND FOR 2.15 |
| 1090 | 1 | 2276 | 627 | .000197 | L | EQUIV PIN COND FOR 2.15 |
| 1091 | 1 | 2281 | 128 | .000296 | L | EQUIV PIN COND FOR 2.16 |
| 1092 | 1 | 2282 | 228 | .000197 | L | EQUIV PIN COND FOR 2.16 |
| 1093 | 1 | 2283 | 328 | .000296 | L | EQUIV PIN COND FOR 2.16 |
| 1094 | 1 | 2284 | 428 | .000197 | L | EQUIV PIN COND FOR 2.16 |
| 1095 | 1 | 2285 | 528 | .000296 | L | EQUIV PIN COND FOR 2.16 |
| 1096 | 1 | 2286 | 628 | .000197 | L | EQUIV PIN COND FOR 2.16 |
| 1097 | 1 | 2291 | 129 | .000296 | L | EQUIV PIN COND FOR 2.17 |
| 1098 | 1 | 2292 | 229 | .000197 | L | EQUIV PIN COND FOR 2.17 |

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CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                       End
        FlSave/Purge       F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|---|---|---|---|---|---|---|
| 1099 | 1 | 2293 | 329 | .000296 | L | EQUIV PIN COND FOR 2.17 |
| 1100 | 1 | 2294 | 429 | .000197 | L | EQUIV PIN COND FOR 2.17 |
| 1101 | 1 | 2295 | 529 | .000296 | L | EQUIV PIN COND FOR 2.17 |
| 1102 | 1 | 2296 | 629 | .000197 | L | EQUIV PIN COND FOR 2.17 |
| 1103 | 1 | 2301 | 130 | .000296 | L | EQUIV PIN COND FOR 2.18 |
| 1104 | 1 | 2302 | 230 | .000197 | L | EQUIV PIN COND FOR 2.18 |
| 1105 | 1 | 2303 | 330 | .000296 | L | EQUIV PIN COND FOR 2.18 |
| 1106 | 1 | 2304 | 430 | .000197 | L | EQUIV PIN COND FOR 2.18 |
| 1107 | 1 | 2305 | 530 | .000296 | L | EQUIV PIN COND FOR 2.18 |
| 1108 | 1 | 2306 | 630 | .000197 | L | EQUIV PIN COND FOR 2.18 |
| 1109 | 1 | 3011 | 1101 | .000296 | L | EQUIV PIN COND FOR 4.00 |
| 1110 | 1 | 3012 | 1201 | .000197 | L | EQUIV PIN COND FOR 4.00 |
| 1111 | 1 | 3013 | 1301 | .000296 | L | EQUIV PIN COND FOR 4.00 |
| 1112 | 1 | 3014 | 1401 | .000197 | L | EQUIV PIN COND FOR 4.00 |
| 1113 | 1 | 3015 | 1501 | .000296 | L | EQUIV PIN COND FOR 4.00 |
| 1114 | 1 | 3016 | 1601 | .000197 | L | EQUIV PIN COND FOR 4.00 |
| 1115 | 1 | 3021 | 1102 | .000296 | L | EQUIV PIN COND FOR 5.01 |
| 1116 | 1 | 3022 | 1202 | .000197 | L | EQUIV PIN COND FOR 5.01 |

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CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                       End
        FlSave/Purge       F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1117 | 1 | 3023 | 1302 | .000296 | L | EQUIV PIN COND FOR 5.01 |
| 1118 | 1 | 3024 | 1402 | .000197 | L | EQUIV PIN COND FOR 5.01 |
| 1119 | 1 | 3025 | 1502 | .000296 | L | EQUIV PIN COND FOR 5.01 |
| 1120 | 1 | 3026 | 1602 | .000197 | L | EQUIV PIN COND FOR 5.01 |
| 1121 | 1 | 3031 | 1103 | .000296 | L | EQUIV PIN COND FOR 5.02 |
| 1122 | 1 | 3032 | 1203 | .000197 | L | EQUIV PIN COND FOR 5.02 |
| 1123 | 1 | 3033 | 1303 | .000296 | L | EQUIV PIN COND FOR 5.02 |
| 1124 | 1 | 3034 | 1403 | .000197 | L | EQUIV PIN COND FOR 5.02 |
| 1125 | 1 | 3035 | 1503 | .000296 | L | EQUIV PIN COND FOR 5.02 |
| 1126 | 1 | 3036 | 1603 | .000197 | L | EQUIV PIN COND FOR 5.03 |
| 1127 | 1 | 3041 | 1104 | .000296 | L | EQUIV PIN COND FOR 5.03 |
| 1128 | 1 | 3042 | 1204 | .000197 | L | EQUIV PIN COND FOR 5.03 |
| 1129 | 1 | 3043 | 1304 | .000296 | L | EQUIV PIN COND FOR 5.03 |
| 1130 | 1 | 3044 | 1404 | .000197 | L | EQUIV PIN COND FOR 5.03 |
| 1131 | 1 | 3045 | 1504 | .000296 | L | EQUIV PIN COND FOR 5.03 |
| 1132 | 1 | 3046 | 1604 | .000197 | L | EQUIV PIN COND FOR 5.04 |
| 1133 | 1 | 3051 | 1105 | .000296 | L | EQUIV PIN COND FOR 5.04 |
| 1134 | 1 | 3052 | 1205 | .000197 | L | EQUIV PIN COND FOR 5.04 |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1135 | 1 | 3053 | 1305 | .000296 | L | EQUIV PIN COND FOR 5.04 |
| 1136 | 1 | 3054 | 1405 | .000197 | L | EQUIV PIN COND FOR 5.04 |
| 1137 | 1 | 3055 | 1505 | .000296 | L | EQUIV PIN COND FOR 5.04 |
| 1138 | 1 | 3056 | 1605 | .000197 | L | EQUIV PIN COND FOR 5.05 |
| 1139 | 1 | 3061 | 1106 | .000296 | L | EQUIV PIN COND FOR 5.05 |
| 1140 | 1 | 3062 | 1206 | .000197 | L | EQUIV PIN COND FOR 5.05 |
| 1141 | 1 | 3063 | 1306 | .000296 | L | EQUIV PIN COND FOR 5.05 |
| 1142 | 1 | 3064 | 1406 | .000197 | L | EQUIV PIN COND FOR 5.05 |
| 1143 | 1 | 3065 | 1506 | .000296 | L | EQUIV PIN COND FOR 5.05 |
| 1144 | 1 | 3066 | 1606 | .000197 | L | EQUIV PIN COND FOR 5.05 |
| 1145 | 1 | 3091 | 1109 | .000296 | L | EQUIV PIN COND FOR 6.03 |
| 1146 | 1 | 3092 | 1209 | .000197 | L | EQUIV PIN COND FOR 6.03 |
| 1147 | 1 | 3093 | 1309 | .000296 | L | EQUIV PIN COND FOR 6.03 |
| 1148 | 1 | 3094 | 1409 | .000197 | L | EQUIV PIN COND FOR 6.03 |
| 1149 | 1 | 3095 | 1509 | .000296 | L | EQUIV PIN COND FOR 6.03 |
| 1150 | 1 | 3096 | 1609 | .000197 | L | EQUIV PIN COND FOR 6.03 |
| 1151 | 1 | 3101 | 1110 | .000296 | L | EQUIV PIN COND FOR 6.04 |
| 1152 | 1 | 3102 | 1210 | .000197 | L | EQUIV PIN COND FOR 6.04 |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1153 | 1 | 3103 | 1310 | .000296 | L | EQUIV PIN COND FOR 6.04 |
| 1154 | 1 | 3104 | 1410 | .000197 | L | EQUIV PIN COND FOR 6.04 |
| 1155 | 1 | 3105 | 1510 | .000296 | L | EQUIV PIN COND FOR 6.04 |
| 1156 | 1 | 3106 | 1610 | .000197 | L | EQUIV PIN COND FOR 6.04 |
| 1157 | 1 | 3111 | 1111 | .000296 | L | EQUIV PIN COND FOR 6.05 |
| 1158 | 1 | 3112 | 1211 | .000197 | L | EQUIV PIN COND FOR 6.05 |
| 1159 | 1 | 3113 | 1311 | .000296 | L | EQUIV PIN COND FOR 6.05 |
| 1160 | 1 | 3114 | 1411 | .000197 | L | EQUIV PIN COND FOR 6.05 |
| 1161 | 1 | 3115 | 1511 | .000296 | L | EQUIV PIN COND FOR 6.05 |
| 1162 | 1 | 3116 | 1611 | .000197 | L | EQUIV PIN COND FOR 6.05 |
| 1163 | 1 | 3121 | 1112 | .000296 | L | EQUIV PIN COND FOR 6.06 |
| 1164 | 1 | 3122 | 1212 | .000197 | L | EQUIV PIN COND FOR 6.06 |
| 1165 | 1 | 3123 | 1312 | .000296 | L | EQUIV PIN COND FOR 6.06 |
| 1166 | 1 | 3124 | 1412 | .000197 | L | EQUIV PIN COND FOR 6.06 |
| 1167 | 1 | 3125 | 1512 | .000296 | L | EQUIV PIN COND FOR 6.06 |
| 1168 | 1 | 3126 | 1612 | .000197 | L | EQUIV PIN COND FOR 6.06 |
| 1169 | 1 | 3141 | 1114 | .000296 | L | EQUIV PIN COND FOR 7.01 |
| 1170 | 1 | 3142 | 1214 | .000197 | L | EQUIV PIN COND FOR 7.01 |

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CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                      End
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark FlOSearch
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| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1171 | 1 | 3143 | 1314 | .000197 | L | EQUIV PIN COND FOR 7.01 |
| 1172 | 1 | 3144 | 1414 | .000296 | L | EQUIV PIN COND FOR 7.01 |
| 1173 | 1 | 3145 | 1514 | .000197 | L | EQUIV PIN COND FOR 7.01 |
| 1174 | 1 | 3146 | 1614 | .000296 | L | EQUIV PIN COND FOR 7.01 |
| 1175 | 1 | 3151 | 1115 | .000197 | L | EQUIV PIN COND FOR 7.02 |
| 1176 | 1 | 3152 | 1215 | .000296 | L | EQUIV PIN COND FOR 7.02 |
| 1177 | 1 | 3153 | 1315 | .000197 | L | EQUIV PIN COND FOR 7.02 |
| 1178 | 1 | 3154 | 1415 | .000296 | L | EQUIV PIN COND FOR 7.02 |
| 1179 | 1 | 3155 | 1515 | .000197 | L | EQUIV PIN COND FOR 7.02 |
| 1180 | 1 | 3156 | 1615 | .000296 | L | EQUIV PIN COND FOR 7.02 |
| 1181 | 1 | 3161 | 1116 | .000197 | L | EQUIV PIN COND FOR 7.03 |
| 1182 | 1 | 3162 | 1216 | .000296 | L | EQUIV PIN COND FOR 7.03 |
| 1183 | 1 | 3163 | 1316 | .000197 | L | EQUIV PIN COND FOR 7.03 |
| 1184 | 1 | 3164 | 1416 | .000296 | L | EQUIV PIN COND FOR 7.03 |
| 1185 | 1 | 3165 | 1516 | .000197 | L | EQUIV PIN COND FOR 7.03 |
| 1186 | 1 | 3166 | 1616 | .000296 | L | EQUIV PIN COND FOR 7.03 |
| 1187 | 1 | 3171 | 1117 | .000197 | L | EQUIV PIN COND FOR 8.00 |
| 1188 | 1 | 3172 | 1217 | .000296 | L | EQUIV PIN COND FOR 8.00 |

```
CTRL-FlImport ITAS_NC      ALT-F3AutoMLI    UDC Allowed                PgDn PgUp Home
SHFT-FlImport Column    Shift-F3AutoCHT    Shift-F5Del/Pur                      End
        FlSave/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark FlOSearch
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1189 | 1 | 3173 | 1317 | .000296 | L | EQUIV PIN COND FOR 8.00 |
| 1190 | 1 | 3174 | 1417 | .000197 | L | EQUIV PIN COND FOR 8.00 |
| 1191 | 1 | 3175 | 1517 | .000296 | L | EQUIV PIN COND FOR 8.00 |
| 1192 | 1 | 3176 | 1617 | .000197 | L | EQUIV PIN COND FOR 8.00 |
| 1193 | 1 | 2011 | 2012 | .1465 | L | PIN COND |
| 1194 | 1 | 2012 | 2013 | .1465 | L | PIN COND |
| 1195 | 1 | 2013 | 2014 | .1465 | L | PIN COND |
| 1196 | 1 | 2014 | 2015 | .1465 | L | PIN COND |
| 1197 | 1 | 2015 | 2016 | .1465 | L | PIN COND |
| 1198 | 1 | 2021 | 2022 | .1465 | L | PIN COND |
| 1199 | 1 | 2022 | 2023 | .1465 | L | PIN COND |
| 1200 | 1 | 2023 | 2024 | .1465 | L | PIN COND |
| 1201 | 1 | 2024 | 2025 | .1465 | L | PIN COND |
| 1202 | 1 | 2025 | 2026 | .1465 | L | PIN COND |
| 1203 | 1 | 2031 | 2032 | .1465 | L | PIN COND |
| 1204 | 1 | 2032 | 2033 | .1465 | L | PIN COND |
| 1205 | 1 | 2033 | 2034 | .1465 | L | PIN COND |
| 1206 | 1 | 2034 | 2035 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1207 | 1 | 2035 | 2036 | .1465 | L | PIN COND |
| 1208 | 1 | 2041 | 2042 | .1465 | L | PIN COND |
| 1209 | 1 | 2042 | 2043 | .1465 | L | PIN COND |
| 1210 | 1 | 2043 | 2044 | .1465 | L | PIN COND |
| 1211 | 1 | 2044 | 2045 | .1465 | L | PIN COND |
| 1212 | 1 | 2045 | 2046 | .1465 | L | PIN COND |
| 1213 | 1 | 2051 | 2052 | .1465 | L | PIN COND |
| 1214 | 1 | 2052 | 2053 | .1465 | L | PIN COND |
| 1215 | 1 | 2053 | 2054 | .1465 | L | PIN COND |
| 1216 | 1 | 2054 | 2055 | .1465 | L | PIN COND |
| 1217 | 1 | 2055 | 2056 | .1465 | L | PIN COND |
| 1218 | 1 | 2061 | 2062 | .1465 | L | PIN COND |
| 1219 | 1 | 2062 | 2063 | .1465 | L | PIN COND |
| 1220 | 1 | 2063 | 2064 | .1465 | L | PIN COND |
| 1221 | 1 | 2064 | 2065 | .1465 | L | PIN COND |
| 1222 | 1 | 2065 | 2066 | .1465 | L | PIN COND |
| 1223 | 1 | 2071 | 2072 | .1465 | L | PIN COND |
| 1224 | 1 | 2072 | 2073 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1225 | 1 | 2073 | 2074 | .1465 | L | PIN COND |
| 1226 | 1 | 2074 | 2075 | .1465 | L | PIN COND |
| 1227 | 1 | 2075 | 2076 | .1465 | L | PIN COND |
| 1228 | 1 | 2081 | 2082 | .1465 | L | PIN COND |
| 1229 | 1 | 2082 | 2083 | .1465 | L | PIN COND |
| 1230 | 1 | 2083 | 2084 | .1465 | L | PIN COND |
| 1231 | 1 | 2084 | 2085 | .1465 | L | PIN COND |
| 1232 | 1 | 2085 | 2086 | .1465 | L | PIN COND |
| 1233 | 1 | 2091 | 2092 | .1465 | L | PIN COND |
| 1234 | 1 | 2092 | 2093 | .1465 | L | PIN COND |
| 1235 | 1 | 2093 | 2094 | .1465 | L | PIN COND |
| 1236 | 1 | 2094 | 2095 | .1465 | L | PIN COND |
| 1237 | 1 | 2095 | 2096 | .1465 | L | PIN COND |
| 1238 | 1 | 2101 | 2102 | .1465 | L | PIN COND |
| 1239 | 1 | 2102 | 2103 | .1465 | L | PIN COND |
| 1240 | 1 | 2103 | 2104 | .1465 | L | PIN COND |
| 1241 | 1 | 2104 | 2105 | .1465 | L | PIN COND |
| 1242 | 1 | 2105 | 2106 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                     End
      F1Save/Purge      F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1243 | 1 | 2111 | 2112 | .1465 | L | PIN COND |
| 1244 | 1 | 2112 | 2113 | .1465 | L | PIN COND |
| 1245 | 1 | 2113 | 2114 | .1465 | L | PIN COND |
| 1246 | 1 | 2114 | 2115 | .1465 | L | PIN COND |
| 1247 | 1 | 2115 | 2116 | .1465 | L | PIN COND |
| 1248 | 1 | 2121 | 2122 | .1465 | L | PIN COND |
| 1249 | 1 | 2122 | 2123 | .1465 | L | PIN COND |
| 1250 | 1 | 2123 | 2124 | .1465 | L | PIN COND |
| 1251 | 1 | 2124 | 2125 | .1465 | L | PIN COND |
| 1252 | 1 | 2125 | 2126 | .1465 | L | PIN COND |
| 1253 | 1 | 2131 | 2132 | .1465 | L | PIN COND |
| 1254 | 1 | 2132 | 2133 | .1465 | L | PIN COND |
| 1255 | 1 | 2133 | 2134 | .1465 | L | PIN COND |
| 1256 | 1 | 2134 | 2135 | .1465 | L | PIN COND |
| 1257 | 1 | 2135 | 2136 | .1465 | L | PIN COND |
| 1258 | 1 | 2141 | 2142 | .1465 | L | PIN COND |
| 1259 | 1 | 2142 | 2143 | .1465 | L | PIN COND |
| 1260 | 1 | 2143 | 2144 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                     End
      F1Save/Purge      F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1261 | 1 | 2144 | 2145 | .1465 | L | PIN COND |
| 1262 | 1 | 2145 | 2146 | .1465 | L | PIN COND |
| 1263 | 1 | 2151 | 2152 | .1465 | L | PIN COND |
| 1264 | 1 | 2152 | 2153 | .1465 | L | PIN COND |
| 1265 | 1 | 2153 | 2154 | .1465 | L | PIN COND |
| 1266 | 1 | 2154 | 2155 | .1465 | L | PIN COND |
| 1267 | 1 | 2155 | 2156 | .1465 | L | PIN COND |
| 1268 | 1 | 2161 | 2162 | .1465 | L | PIN COND |
| 1269 | 1 | 2162 | 2163 | .1465 | L | PIN COND |
| 1270 | 1 | 2163 | 2164 | .1465 | L | PIN COND |
| 1271 | 1 | 2164 | 2165 | .1465 | L | PIN COND |
| 1272 | 1 | 2165 | 2166 | .1465 | L | PIN COND |
| 1273 | 1 | 2171 | 2172 | .1465 | L | PIN COND |
| 1274 | 1 | 2172 | 2173 | .1465 | L | PIN COND |
| 1275 | 1 | 2173 | 2174 | .1465 | L | PIN COND |
| 1276 | 1 | 2174 | 2175 | .1465 | L | PIN COND |
| 1277 | 1 | 2175 | 2176 | .1465 | L | PIN COND |
| 1278 | 1 | 2181 | 2182 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                    End
       F1Save/Purge         F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1279 | 1 | 2182 | 2183 | .1465 | L | PIN COND |
| 1280 | 1 | 2183 | 2184 | .1465 | L | PIN COND |
| 1281 | 1 | 2184 | 2185 | .1465 | L | PIN COND |
| 1282 | 1 | 2185 | 2186 | .1465 | L | PIN COND |
| 1283 | 1 | 2191 | 2192 | .1465 | L | PIN COND |
| 1284 | 1 | 2192 | 2193 | .1465 | L | PIN COND |
| 1285 | 1 | 2193 | 2194 | .1465 | L | PIN COND |
| 1286 | 1 | 2194 | 2195 | .1465 | L | PIN COND |
| 1287 | 1 | 2195 | 2196 | .1465 | L | PIN COND |
| 1288 | 1 | 2201 | 2202 | .1465 | L | PIN COND |
| 1289 | 1 | 2202 | 2203 | .1465 | L | PIN COND |
| 1290 | 1 | 2203 | 2204 | .1465 | L | PIN COND |
| 1291 | 1 | 2204 | 2205 | .1465 | L | PIN COND |
| 1292 | 1 | 2205 | 2206 | .1465 | L | PIN COND |
| 1293 | 1 | 2211 | 2212 | .1465 | L | PIN COND |
| 1294 | 1 | 2212 | 2213 | .1465 | L | PIN COND |
| 1295 | 1 | 2213 | 2214 | .1465 | L | PIN COND |
| 1296 | 1 | 2214 | 2215 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur                    End
       F1Save/Purge         F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1297 | 1 | 2215 | 2216 | .1465 | L | PIN COND |
| 1298 | 1 | 2221 | 2222 | .1465 | L | PIN COND |
| 1299 | 1 | 2222 | 2223 | .1465 | L | PIN COND |
| 1300 | 1 | 2223 | 2224 | .1465 | L | PIN COND |
| 1301 | 1 | 2224 | 2225 | .1465 | L | PIN COND |
| 1302 | 1 | 2225 | 2226 | .1465 | L | PIN COND |
| 1303 | 1 | 2231 | 2232 | .1465 | L | PIN COND |
| 1304 | 1 | 2232 | 2233 | .1465 | L | PIN COND |
| 1305 | 1 | 2233 | 2234 | .1465 | L | PIN COND |
| 1306 | 1 | 2234 | 2235 | .1465 | L | PIN COND |
| 1307 | 1 | 2235 | 2236 | .1465 | L | PIN COND |
| 1308 | 1 | 2241 | 2242 | .1465 | L | PIN COND |
| 1309 | 1 | 2242 | 2243 | .1465 | L | PIN COND |
| 1310 | 1 | 2243 | 2244 | .1465 | L | PIN COND |
| 1311 | 1 | 2244 | 2245 | .1465 | L | PIN COND |
| 1312 | 1 | 2245 | 2246 | .1465 | L | PIN COND |
| 1313 | 1 | 2251 | 2252 | .1465 | L | PIN COND |
| 1314 | 1 | 2252 | 2253 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1315 | 1 | 2253 | 2254 | .1465 | L | PIN COND |
| 1316 | 1 | 2254 | 2255 | .1465 | L | PIN COND |
| 1317 | 1 | 2255 | 2256 | .1465 | L | PIN COND |
| 1318 | 1 | 2261 | 2262 | .1465 | L | PIN COND |
| 1319 | 1 | 2262 | 2263 | .1465 | L | PIN COND |
| 1320 | 1 | 2263 | 2264 | .1465 | L | PIN COND |
| 1321 | 1 | 2264 | 2265 | .1465 | L | PIN COND |
| 1322 | 1 | 2265 | 2266 | .1465 | L | PIN COND |
| 1323 | 1 | 2271 | 2272 | .1465 | L | PIN COND |
| 1324 | 1 | 2272 | 2273 | .1465 | L | PIN COND |
| 1325 | 1 | 2273 | 2274 | .1465 | L | PIN COND |
| 1326 | 1 | 2274 | 2275 | .1465 | L | PIN COND |
| 1327 | 1 | 2275 | 2276 | .1465 | L | PIN COND |
| 1328 | 1 | 2281 | 2282 | .1465 | L | PIN COND |
| 1329 | 1 | 2282 | 2283 | .1465 | L | PIN COND |
| 1330 | 1 | 2283 | 2284 | .1465 | L | PIN COND |
| 1331 | 1 | 2284 | 2285 | .1465 | L | PIN COND |
| 1332 | 1 | 2285 | 2286 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1333 | 1 | 2291 | 2292 | .1465 | L | PIN COND |
| 1334 | 1 | 2292 | 2293 | .1465 | L | PIN COND |
| 1335 | 1 | 2293 | 2294 | .1465 | L | PIN COND |
| 1336 | 1 | 2294 | 2295 | .1465 | L | PIN COND |
| 1337 | 1 | 2295 | 2296 | .1465 | L | PIN COND |
| 1338 | 1 | 2301 | 2302 | .1465 | L | PIN COND |
| 1339 | 1 | 2302 | 2303 | .1465 | L | PIN COND |
| 1340 | 1 | 2303 | 2304 | .1465 | L | PIN COND |
| 1341 | 1 | 2304 | 2305 | .1465 | L | PIN COND |
| 1342 | 1 | 2305 | 2306 | .1465 | L | PIN COND |
| 1343 | 1 | 3011 | 3012 | .1465 | L | PIN COND |
| 1344 | 1 | 3012 | 3013 | .1465 | L | PIN COND |
| 1345 | 1 | 3013 | 3014 | .1465 | L | PIN COND |
| 1346 | 1 | 3014 | 3015 | .1465 | L | PIN COND |
| 1347 | 1 | 3015 | 3016 | .1465 | L | PIN COND |
| 1348 | 1 | 3021 | 3022 | .1465 | L | PIN COND |
| 1349 | 1 | 3022 | 3023 | .1465 | L | PIN COND |
| 1350 | 1 | 3023 | 3024 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1351 | 1 | 3024 | 3025 | .1465 | L | PIN COND |
| 1352 | 1 | 3025 | 3026 | .1465 | L | PIN COND |
| 1353 | 1 | 3031 | 3032 | .1465 | L | PIN COND |
| 1354 | 1 | 3032 | 3033 | .1465 | L | PIN COND |
| 1355 | 1 | 3033 | 3034 | .1465 | L | PIN COND |
| 1356 | 1 | 3034 | 3035 | .1465 | L | PIN COND |
| 1357 | 1 | 3035 | 3036 | .1465 | L | PIN COND |
| 1358 | 1 | 3041 | 3042 | .1465 | L | PIN COND |
| 1359 | 1 | 3042 | 3043 | .1465 | L | PIN COND |
| 1360 | 1 | 3043 | 3044 | .1465 | L | PIN COND |
| 1361 | 1 | 3044 | 3045 | .1465 | L | PIN COND |
| 1362 | 1 | 3045 | 3046 | .1465 | L | PIN COND |
| 1363 | 1 | 3051 | 3052 | .1465 | L | PIN COND |
| 1364 | 1 | 3052 | 3053 | .1465 | L | PIN COND |
| 1365 | 1 | 3053 | 3054 | .1465 | L | PIN COND |
| 1366 | 1 | 3054 | 3055 | .1465 | L | PIN COND |
| 1367 | 1 | 3055 | 3056 | .1465 | L | PIN COND |
| 1368 | 1 | 3061 | 3062 | .1465 | L | PIN COND |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1369 | 1 | 3062 | 3063 | .1465 | L | PIN COND |
| 1370 | 1 | 3063 | 3064 | .1465 | L | PIN COND |
| 1371 | 1 | 3064 | 3065 | .1465 | L | PIN COND |
| 1372 | 1 | 3065 | 3066 | .1465 | L | PIN COND |
| 1373 | 1 | 3091 | 3092 | .1465 | L | PIN COND |
| 1374 | 1 | 3092 | 3093 | .1465 | L | PIN COND |
| 1375 | 1 | 3093 | 3094 | .1465 | L | PIN COND |
| 1376 | 1 | 3094 | 3095 | .1465 | L | PIN COND |
| 1377 | 1 | 3095 | 3096 | .1465 | L | PIN COND |
| 1378 | 1 | 3101 | 3102 | .1465 | L | PIN COND |
| 1379 | 1 | 3102 | 3103 | .1465 | L | PIN COND |
| 1380 | 1 | 3103 | 3104 | .1465 | L | PIN COND |
| 1381 | 1 | 3104 | 3105 | .1465 | L | PIN COND |
| 1382 | 1 | 3105 | 3106 | .1465 | L | PIN COND |
| 1383 | 1 | 3111 | 3112 | .1465 | L | PIN COND |
| 1384 | 1 | 3112 | 3113 | .1465 | L | PIN COND |
| 1385 | 1 | 3113 | 3114 | .1465 | L | PIN COND |
| 1386 | 1 | 3114 | 3115 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed           PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur               End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1387 | 1 | 3115 | 3116 | .1465 | L | PIN COND |
| 1388 | 1 | 3121 | 3122 | .1465 | L | PIN COND |
| 1389 | 1 | 3122 | 3123 | .1465 | L | PIN COND |
| 1390 | 1 | 3123 | 3124 | .1465 | L | PIN COND |
| 1391 | 1 | 3124 | 3125 | .1465 | L | PIN COND |
| 1392 | 1 | 3125 | 3126 | .1465 | L | PIN COND |
| 1393 | 1 | 3141 | 3142 | .1465 | L | PIN COND |
| 1394 | 1 | 3142 | 3143 | .1465 | L | PIN COND |
| 1395 | 1 | 3143 | 3144 | .1465 | L | PIN COND |
| 1396 | 1 | 3144 | 3145 | .1465 | L | PIN COND |
| 1397 | 1 | 3145 | 3146 | .1465 | L | PIN COND |
| 1398 | 1 | 3151 | 3152 | .1465 | L | PIN COND |
| 1399 | 1 | 3152 | 3153 | .1465 | L | PIN COND |
| 1400 | 1 | 3153 | 3154 | .1465 | L | PIN COND |
| 1401 | 1 | 3154 | 3155 | .1465 | L | PIN COND |
| 1402 | 1 | 3155 | 3156 | .1465 | L | PIN COND |
| 1403 | 1 | 3161 | 3162 | .1465 | L | PIN COND |
| 1404 | 1 | 3162 | 3163 | .1465 | L | PIN COND |

```
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed           PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT   Shift-F5Del/Pur               End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete   F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|------|-------------|-----|-------------|
| 1405 | 1 | 3163 | 3164 | .1465 | L | PIN COND |
| 1406 | 1 | 3164 | 3165 | .1465 | L | PIN COND |
| 1407 | 1 | 3165 | 3166 | .1465 | L | PIN COND |
| 1408 | 1 | 3171 | 3172 | .1465 | L | PIN COND |
| 1409 | 1 | 3172 | 3173 | .1465 | L | PIN COND |
| 1410 | 1 | 3173 | 3174 | .1465 | L | PIN COND |
| 1411 | 1 | 3174 | 3175 | .1465 | L | PIN COND |
| 1412 | 1 | 3175 | 3176 | .1465 | L | PIN COND |

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# APPENDIX N.   ITAS BATTERY GEOMETRY MODEL



*PC_ITAS*    *    LOWER EQUIP PLATE, BATTERY A+B, DCS    * 10.12.88 08/15/94



*PC_ITAS*    *    PANSAT SIDEWALL STRUCTURE    * 10.18.22 08/15/94

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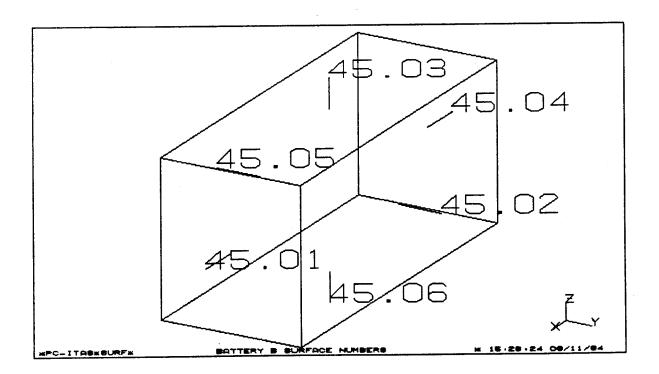
# APPENDIX O. BATTERY B SURFACE AND NODE NUMBERS



*PC-ITAS*NODE*　　　　BATTERY B NODE NUMBERS　　　　* 15.28.28 08/11/94



*PC-ITAS*SURF*　　　　BATTERY B SURFACE NUMBERS　　　　* 15.28.24 08/11/94

# APPENDIX P.   BATTERY OPTICAL PROPERTIES

ëëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëëëëf
□                                                                           □

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 1 | 1.00 | 1 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 2 | 5.00 | 2 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 3 | 10.00 | 3 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 4 | 15.00 | 4 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 5 | 20.00 | 5 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 6 | 25.00 | 6 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 7 | 30.00 | 7 | 0.400 | 0.790 | 1. | 0. | 144 | LOWER EQUIPMENT PL |
| 8 | 35.01 | 8 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 9 | 35.02 | 9 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 10 | 35.03 | 10 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 11 | 35.04 | 11 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 12 | 35.05 | 12 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 13 | 35.06 | 13 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY A |
| 14 | 40.01 | 14 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |
| 15 | 40.02 | 15 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |
| 16 | 40.03 | 16 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |
| 17 | 40.04 | 17 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |
| 18 | 40.05 | 18 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |

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  S-F1Load/Save All           S-F4Auto TM    UDC Allowed              ESCQuit
    F1Load/Save Page F3PropLib F4AutoGen F5ImportPropFmt F6NewPropFile F10Search

□                                                                           □

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 19 | 40.06 | 19 | 0.400 | 0.790 | 1. | 0. | 144 | DCS |
| 20 | 45.01 | 20 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 21 | 45.02 | 21 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 22 | 45.03 | 22 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 23 | 45.04 | 23 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 24 | 45.05 | 24 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 25 | 45.06 | 25 | 0.400 | 0.790 | 1. | 0. | 144 | BATTERY B |
| 26 | 51.00 | 26 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 27 | 55.00 | 27 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 28 | 60.00 | 28 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 29 | 65.00 | 29 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 30 | 70.00 | 30 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 31 | 75.00 | 31 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 32 | 80.00 | 32 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 33 | 82.00 | 33 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE FRONT MI |
| 34 | 84.00 | 34 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE BACK MID |
| 35 | 86.00 | 35 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE RIGHT |
| 36 | 88.00 | 36 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE LEFT |

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  S-F1Load/Save All           S-F4Auto TM    UDC Allowed              ESCQuit
    F1Load/Save Page F3PropLib F4AutoGen F5ImportPropFmt F6NewPropFile F10Search

ëëë Ctrl : Copy (See F2)ëë ITAS Property Data Entry ëëëëëëëëëëëëëëëëëëëëëëëëëëf

| Seq | Surface No | NodeNo | Alpha | Emiss | T/Mass | Dissip | MID | Comments |
|-----|-----------|--------|-------|-------|--------|--------|-----|----------|
| 29 | 65.00 | 29 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 30 | 70.00 | 30 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 31 | 75.00 | 31 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 32 | 80.00 | 32 | 0.400 | 0.790 | 1. | 0. | 144 | UPPER EQUIPMENT PL |
| 33 | 82.00 | 33 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE FRONT MI |
| 34 | 84.00 | 34 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE BACK MID |
| 35 | 86.00 | 35 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE RIGHT |
| 36 | 88.00 | 36 | 0.400 | 0.790 | 1. | 0. | 144 | STRUCTURE LEFT |
| 37 | 92.00 | 37 | 0.400 | 0.790 | 1. | 0. | 144 | RIGHT FRONT SLANT ; |
| 38 | 94.00 | 38 | 0.400 | 0.790 | 1. | 0. | 144 | RIGHT FRONT SLANT |
| 39 | 96.00 | 39 | 0.400 | 0.790 | 1. | 0. | 144 | BACK RIGHT SLANT |
| 40 | 98.00 | 40 | 0.400 | 0.790 | 1. | 0. | 144 | RIGHT BACK SLANT |
| 41 | 99.01 | 41 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |
| 42 | 99.02 | 42 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |
| 43 | 99.03 | 43 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |
| 44 | 99.04 | 44 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |
| 45 | 99.05 | 45 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |
| 46 | 99.06 | 46 | 0.400 | 0.790 | 1. | 0. | 144 | EPS |

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S-F1Load/Save All          S-F4Auto TM    UDC Allowed              ESCQuit
   F1Load/Save Page F3PropLib F4AutoGen F5ImportPropFmt F6NewPropFile F10Search

# APPENDIX Q.   PANSAT TRANSIENT STRUCTURAL ANALYSIS

PANSAT - TRANSIENT - SUNLIGHT ZONE - INTERNAL HEAT DISSIPATION - PASS

Temperatures, degC

| Node | °C | Node | °C | Node | °C | Node | °C | Node | °C | Node | °C |
|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 32.40 | 2 | 33.67 | 3 | 35.07 | 4 | 32.09 | 5 | 33.59 | 6 | |
| 7 | 32.47 | 8 | 33.54 | 9 | 34.69 | 10 | 39.58 | 11 | 40.61 | 12 | |
| 13 | 39.76 | 14 | 41.05 | 15 | 41.37 | 16 | 37.92 | 17 | 38.77 | 18 | |
| 19 | 39.37 | 20 | 38.62 | 21 | 37.18 | 22 | 40.80 | 23 | 39.98 | 24 | |
| 25 | 39.06 | 26 | 38.54 | 27 | 37.08 | 28 | 32.28 | 29 | 30.99 | 30 | |
| 31 | 32.08 | 32 | 30.41 | 33 | 30.00 | 34 | 31.71 | 35 | 30.53 | 36 | |
| 37 | 30.37 | 38 | 30.57 | 39 | 31.03 | 40 | 30.01 | 41 | 30.40 | 42 | |
| 43 | 30.86 | 44 | 31.25 | 45 | 31.81 | 46 | 32.11 | 47 | 32.55 | 48 | |
| 49 | 33.21 | 50 | 33.87 | 51 | 34.13 | 52 | 33.26 | 53 | 33.70 | 54 | |
| 55 | 33.03 | 56 | 32.75 | 57 | 31.78 | 58 | 34.11 | 59 | 33.68 | 60 | |
| 61 | 34.11 | 62 | 33.80 | 63 | 32.85 | 64 | 28.40 | 65 | 27.87 | 66 | |
| 67 | 28.78 | 68 | 27.91 | 69 | 28.55 | 70 | 29.55 | 71 | 28.89 | 72 | |
| 73 | 27.73 | 74 | 29.43 | 75 | 33.79 | 76 | 29.45 | 77 | 32.27 | 78 | |
| 79 | 31.11 | 80 | 33.04 | 81 | 35.23 | 82 | 40.46 | 83 | 40.30 | 84 | |
| 85 | 41.20 | 86 | 40.80 | 87 | 41.71 | 88 | 37.21 | 89 | 35.10 | 90 | |
| 91 | 38.88 | 92 | 37.05 | 93 | 35.60 | 94 | 38.35 | 95 | 36.90 | 96 | |
| 97 | 30.16 | 98 | 29.48 | 99 | 30.39 | 100 | 29.48 | 101 | 31.61 | 102 | |
| 103 | 26.29 | 104 | 24.59 | 105 | 24.93 | 106 | 26.60 | 107 | 25.48 | 108 | |
| 109 | 28.50 | 110 | 27.98 | 111 | 28.44 | 112 | 26.73 | 113 | 26.73 | 114 | |
| 115 | 28.95 | 116 | 29.86 | 117 | 30.52 | 118 | 26.24 | 119 | 25.88 | 120 | |
| 121 | 27.85 | 122 | 27.19 | 123 | 26.76 | 124 | 29.65 | 125 | 29.14 | 126 | |
| 127 | 25.70 | 128 | 25.89 | 129 | 25.45 | 130 | 25.64 | 131 | 26.63 | 132 | |
| 133 | 29.72 | 134 | 30.52 | 135 | 32.04 | 136 | 28.14 | 137 | 28.85 | 138 | |
| 139 | 28.05 | 140 | 28.30 | 141 | 32.10 | 142 | 35.42 | 143 | 36.06 | 144 | |
| 145 | 37.12 | 146 | 41.06 | 147 | 41.32 | 148 | 34.91 | 149 | 33.95 | 150 | |
| 151 | 34.88 | 152 | 32.97 | 153 | 31.51 | 154 | 34.69 | 155 | 31.77 | 156 | |
| 157 | 29.53 | 158 | 28.94 | 159 | 29.44 | 160 | 28.94 | 161 | 30.75 | 162 | |
| 163 | 30.26 | 164 | 30.91 | 165 | 31.62 | 166 | 29.16 | 167 | 29.75 | 168 | |
| 169 | 29.46 | 170 | 29.18 | 171 | 31.59 | 172 | 32.18 | 173 | 32.52 | 174 | |
| 175 | 33.63 | 176 | 36.91 | 177 | 37.05 | 178 | 33.01 | 179 | 32.11 | 180 | |
| 181 | 33.09 | 182 | 31.86 | 183 | 30.65 | 184 | 33.02 | 185 | 31.00 | 186 | |
| 187 | 28.43 | 188 | 28.02 | 189 | 28.73 | 190 | 28.23 | 191 | 30.26 | 192 | |
| 193 | 25.04 | 194 | 25.51 | 195 | 28.20 | 196 | 25.32 | 197 | 26.39 | 198 | |
| 199 | 25.99 | 200 | 27.55 | 201 | 31.35 | 202 | 29.36 | 203 | 27.91 | 204 | |
| 205 | 28.22 | 206 | 27.24 | 207 | 28.56 | 208 | 27.73 | 209 | 27.67 | 210 | |
| 211 | 33.97 | 212 | 34.66 | 213 | 34.63 | 214 | 33.51 | 215 | 32.24 | 216 | |
| 217 | 31.45 | 218 | 31.15 | 219 | 33.70 | 220 | 34.39 | 221 | 34.43 | 222 | |
| 223 | 33.33 | 224 | 33.48 | 225 | 33.44 | 226 | 33.39 | 227 | 32.78 | 228 | |
| 229 | 30.58 | 230 | 30.52 | 231 | 28.77 | 232 | 28.61 | | | | |
| 301 | -272.80 | | | | | | | | | | |

PANSAT - TRANSIENT - SHADOW ZONE - INTERNAL HEAT DISSIPATION - PA

Temperatures, degC

| | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| 1 | 29.93 | 2 | 30.88 | 3 | 31.83 | 4 | 29.32 | 5 | 30.44 |
| 7 | 30.08 | 8 | 30.85 | 9 | 31.66 | 10 | 33.00 | 11 | 33.64 |
| 13 | 33.67 | 14 | 34.77 | 15 | 35.60 | 16 | 32.55 | 17 | 33.56 |
| 19 | 33.64 | 20 | 33.04 | 21 | 31.97 | 22 | 34.48 | 23 | 33.54 |
| 25 | 33.96 | 26 | 33.09 | 27 | 31.99 | 28 | 29.65 | 29 | 28.59 |
| 31 | 29.66 | 32 | 28.44 | 33 | 28.27 | 34 | 29.57 | 35 | 28.79 |
| 37 | 30.28 | 38 | 30.75 | 39 | 31.22 | 40 | 29.99 | 41 | 30.63 |
| 43 | 30.77 | 44 | 31.38 | 45 | 31.91 | 46 | 32.44 | 47 | 32.83 |
| 49 | 33.37 | 50 | 34.00 | 51 | 34.25 | 52 | 33.25 | 53 | 33.66 |
| 55 | 33.23 | 56 | 32.94 | 57 | 31.97 | 58 | 34.26 | 59 | 33.84 |
| 61 | 34.21 | 62 | 33.93 | 63 | 32.98 | 64 | 28.56 | 65 | 27.97 |
| 67 | 28.95 | 68 | 28.07 | 69 | 28.38 | 70 | 29.67 | 71 | 28.99 |
| 73 | 24.95 | 74 | 26.06 | 75 | 28.75 | 76 | 26.75 | 77 | 29.08 |
| 79 | 28.75 | 80 | 30.26 | 81 | 31.09 | 82 | 29.42 | 83 | 29.52 |
| 85 | 30.26 | 86 | 30.81 | 87 | 31.24 | 88 | 30.37 | 89 | 29.63 |
| 91 | 31.86 | 92 | 31.57 | 93 | 30.88 | 94 | 32.42 | 95 | 32.12 |
| 97 | 25.67 | 98 | 25.50 | 99 | 25.41 | 100 | 25.33 | 101 | 26.88 1 |
| 103 | 25.04 | 104 | 24.21 | 105 | 24.73 | 106 | 25.75 | 107 | 25.58 1 |
| 109 | 27.92 | 110 | 28.13 | 111 | 28.74 | 112 | 26.58 | 113 | 26.76 1 |
| 115 | 29.25 | 116 | 30.62 | 117 | 30.90 | 118 | 25.99 | 119 | 25.53 1 |
| 121 | 27.98 | 122 | 27.30 | 123 | 26.85 | 124 | 29.88 | 125 | 29.35 1 |
| 127 | 24.68 | 128 | 24.63 | 129 | 25.13 | 130 | 25.13 | 131 | 26.53 1 |
| 133 | 28.85 | 134 | 29.98 | 135 | 30.14 | 136 | 27.17 | 137 | 27.61 1 |
| 139 | 27.11 | 140 | 26.83 | 141 | 27.67 | 142 | 30.15 | 143 | 30.95 1 |
| 145 | 29.18 | 146 | 27.85 | 147 | 27.92 | 148 | 31.26 | 149 | 30.80 1 |
| 151 | 29.86 | 152 | 29.29 | 153 | 28.08 | 154 | 28.63 | 155 | 28.18 1 |
| 157 | 27.54 | 158 | 27.46 | 159 | 26.82 | 160 | 26.90 | 161 | 26.93 1 |
| 163 | 30.13 | 164 | 31.00 | 165 | 31.55 | 166 | 28.82 | 167 | 29.84 1 |
| 169 | 28.68 | 170 | 29.32 | 171 | 31.50 | 172 | 31.67 | 173 | 32.01 1 |
| 175 | 32.24 | 176 | 36.36 | 177 | 36.47 | 178 | 32.95 | 179 | 32.13 1 |
| 181 | 32.83 | 182 | 31.96 | 183 | 30.78 | 184 | 32.92 | 185 | 31.11 1 |
| 187 | 28.45 | 188 | 27.85 | 189 | 28.67 | 190 | 27.96 | 191 | 30.00 1 |
| 193 | 23.23 | 194 | 22.92 | 195 | 24.73 | 196 | 22.97 | 197 | 23.03 1 |
| 199 | 23.42 | 200 | 23.94 | 201 | 26.55 | 202 | 29.35 | 203 | 27.73 2 |
| 205 | 28.20 | 206 | 26.93 | 207 | 27.28 | 208 | 27.49 | 209 | 27.03 2 |
| 211 | 32.31 | 212 | 32.69 | 213 | 32.56 | 214 | 32.18 | 215 | 31.74 2 |
| 217 | 31.56 | 218 | 31.32 | 219 | 32.66 | 220 | 33.00 | 221 | 32.89 22 |
| 223 | 32.82 | 224 | 33.13 | 225 | 33.10 | 226 | 32.81 | 227 | 32.29 22 |
| 229 | 30.60 | 230 | 30.64 | 231 | 28.51 | 232 | 28.55 | | |
| 301 | -272.80 | | | | | | | | |

# APPENDIX R.   ITAS BATTERY THERMAL MASSES

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|---|---|---|---|---|---|
| 1 | -101 | 33.74 | 19.438 | 0 | LOWER EQUIPMENT PLATE |
| 2 | -102 | 33.74 | 5.692 | 0 | LOWER EQUIPMENT PLATE |
| 3 | -103 | 33.74 | 5.692 | 0 | LOWER EQUIPMENT PLATE |
| 4 | -104 | 33.74 | 2.014 | 0 | LOWER EQUIPMENT PLATE |
| 5 | -105 | 33.74 | 2.014 | 0 | LOWER EQUIPMENT PLATE |
| 6 | -106 | 33.74 | 2.014 | 0 | LOWER EQUIPMENT PLATE |
| 7 | -107 | 33.74 | 2.014 | 0 | LOWER EQUIPMENT PLATE |
| 8 | 201 | 30 | 2.169 | 0 | BATTERY A |
| 9 | 202 | 30 | 5.327 | 0 | BATTERY A |
| 10 | 203 | 30 | 3.3 | 0 | BATTERY A |
| 11 | 204 | 30 | 2.169 | 0 | BATTERY A |
| 12 | 205 | 30 | 5.327 | 0 | BATTERY A |
| 13 | 206 | 30 | 3.3 | 0 | BATTERY A |
| 14 | 301 | 30 | 3.805 | 0 | DCS |
| 15 | 302 | 30 | 6.342 | 0 | DCS |
| 16 | 303 | 30 | 7.610 | 0 | DCS |
| 17 | 304 | 30 | 3.805 | 0 | DCS |
| 18 | 305 | 30 | 6.342 | 0 | DCS |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|---|---|---|---|---|---|
| 19 | 306 | 30 | 7.610 | 0 | DCS |
| 20 | 401 | 30 | 2.169 | 0 | BATTERY B |
| 21 | 402 | 30 | 5.327 | 0 | BATTERY B |
| 22 | 403 | 30 | 3.3 | 0 | BATTERY B |
| 23 | 404 | 30 | 2.169 | 0 | BATTERY B |
| 24 | 405 | 30 | 5.327 | 0 | BATTERY B |
| 25 | 406 | 30 | 3.3 | 0 | BATTERY B |
| 26 | -501 | 33.08 | 9.719 | 0 | UPPER EQUIPMENT PLATE |
| 27 | -502 | 33.08 | 2.846 | 0 | UPPER EQUIPMENT PLATE |
| 28 | -503 | 33.08 | 2.846 | 0 | UPPER EQUIPMENT PLATE |
| 29 | -504 | 33.08 | 1.068 | 0 | UPPER EQUIPMENT PLATE |
| 30 | -505 | 33.08 | 1.068 | 0 | UPPER EQUIPMENT PLATE |
| 31 | -506 | 33.08 | 1.068 | 0 | UPPER EQUIPMENT PLATE |
| 32 | -507 | 33.08 | 1.068 | 0 | UPPER EQUIPMENT PLATE |
| 33 | -601 | 33.44 | 2.014 | 0 | PANSAT STRUCTURE |
| 34 | -602 | 39.87 | 2.014 | 0 | PANSAT STRUCTURE |
| 35 | -603 | 38.83 | 2.014 | 0 | PANSAT STRUCTURE |
| 36 | -604 | 31.14 | 2.014 | 0 | PANSAT STRUCTURE |

| SEQN | NodeNo | Temp-C | ThrMass | Dissip | Comment |
|------|--------|--------|---------|--------|---------|
| 37 | -605 | 30.79 | 2.014 | 0 | PANSAT STRUCTURE |
| 38 | -606 | 33.26 | 2.014 | 0 | PANSAT STRUCTURE |
| 39 | -607 | 33.26 | 2.014 | 0 | PANSAT STRUCTURE |
| 40 | -608 | 28.56 | 2.014 | 0 | PANSAT STRUCTURE |
| 41 | 701 | 30 | 1.598 | 0 | EPS |
| 42 | 702 | 30 | 1.788 | 0 | EPS |
| 43 | 703 | 30 | 9.132 | 0 | EPS |
| 44 | 704 | 30 | 1.598 | 0 | EPS |
| 45 | 705 | 30 | 1.788 | 0 | EPS |
| 46 | 706 | 30 | 9.132 | 0 | EPS |
| 47 | 1500 | 30 | 0 | 1 | HEAT DISSIPATION IN BATTERY A |
| 48 | 1600 | 30 | 0 | 6.25 | HEAT DISSIPATION IN DCS |
| 49 | 1700 | 30 | 0 | .5 | HEAT DISSIPATION IN BATTERY B |
| 50 | 1800 | 30 | 0 | .5 | HEAT DISSIPATION IN EPS |

# APPENDIX S.   BATTERY THERMAL MASS CALCULATIONS

| | | | | BATTERY THERMAL CAPACITANCES | | | | |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| NODE | area | thickness | volume | ro-Al | c-Al | conv fact | in-m | thr mass |
| 101 | 122.6 | 0.25 | 30.65 | 2787 | 0.199 | 69.78 | 61024 | 19.43797 |
| 102 | 35.9 | 0.25 | 8.975 | 2787 | 0.199 | 69.78 | 61024 | 5.691868 |
| 103 | 35.9 | 0.25 | 8.975 | 2787 | 0.199 | 69.78 | 61024 | 5.691868 |
| 104 | 12.7 | 0.25 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 105 | 12.7 | 0.25 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 106 | 12.7 | 0.25 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 107 | 12.7 | 0.25 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 201 | 17.1 | 0.2 | 3.42 | 2787 | 0.199 | 69.78 | 61024 | 2.168935 |
| 202 | 42 | 0.2 | 8.4 | 2787 | 0.199 | 69.78 | 61024 | 5.327208 |
| 203 | 26 | 0.2 | 5.2 | 2787 | 0.199 | 69.78 | 61024 | 3.297795 |
| 204 | 17.1 | 0.2 | 3.42 | 2787 | 0.199 | 69.78 | 61024 | 2.168935 |
| 205 | 42 | 0.2 | 8.4 | 2787 | 0.199 | 69.78 | 61024 | 5.327208 |
| 206 | 26 | 0.2 | 5.2 | 2787 | 0.199 | 69.78 | 61024 | 3.297795 |
| 301 | 30 | 0.2 | 6 | 2787 | 0.199 | 69.78 | 61024 | 3.805148 |
| 302 | 50 | 0.2 | 10 | 2787 | 0.199 | 69.78 | 61024 | 6.341914 |
| 303 | 60 | 0.2 | 12 | 2787 | 0.199 | 69.78 | 61024 | 7.610297 |
| 304 | 30 | 0.2 | 6 | 2787 | 0.199 | 69.78 | 61024 | 3.805148 |
| 305 | 50 | 0.2 | 10 | 2787 | 0.199 | 69.78 | 61024 | 6.341914 |
| 306 | 60 | 0.2 | 12 | 2787 | 0.199 | 69.78 | 61024 | 7.610297 |
| 401 | 17.1 | 0.2 | 3.42 | 2787 | 0.199 | 69.78 | 61024 | 2.168935 |
| 402 | 42 | 0.2 | 8.4 | 2787 | 0.199 | 69.78 | 61024 | 5.327208 |
| 403 | 26 | 0.2 | 5.2 | 2787 | 0.199 | 69.78 | 61024 | 3.297795 |
| 404 | 17.1 | 0.2 | 3.42 | 2787 | 0.199 | 69.78 | 61024 | 2.168935 |
| 405 | 42 | 0.2 | 8.4 | 2787 | 0.199 | 69.78 | 61024 | 5.327208 |
| 406 | 26 | 0.2 | 5.2 | 2787 | 0.199 | 69.78 | 61024 | 3.297795 |
| 501 | 122.6 | 0.125 | 15.325 | 2787 | 0.199 | 69.78 | 61024 | 9.718983 |
| 502 | 35.9 | 0.125 | 4.4875 | 2787 | 0.199 | 69.78 | 61024 | 2.845934 |
| 503 | 35.9 | 0.125 | 4.4875 | 2787 | 0.199 | 69.78 | 61024 | 2.845934 |
| 504 | 12.7 | 0.125 | 1.5875 | 2787 | 0.199 | 69.78 | 61024 | 1.006779 |
| 505 | 12.7 | 0.125 | 1.5875 | 2787 | 0.199 | 69.78 | 61024 | 1.006779 |
| 506 | 12.7 | 0.125 | 1.5875 | 2787 | 0.199 | 69.78 | 61024 | 1.006779 |
| 507 | 12.7 | 0.125 | 1.5875 | 2787 | 0.199 | 69.78 | 61024 | 1.006779 |
| 601 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 602 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 603 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 604 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 605 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 606 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 607 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 608 | 50.8 | 0.0625 | 3.175 | 2787 | 0.199 | 69.78 | 61024 | 2.013558 |
| 701 | 12.6 | 0.2 | 2.52 | 2787 | 0.199 | 69.78 | 61024 | 1.598162 |
| 702 | 14.1 | 0.2 | 2.82 | 2787 | 0.199 | 69.78 | 61024 | 1.78842 |
| 703 | 72 | 0.2 | 14.4 | 2787 | 0.199 | 69.78 | 61024 | 9.132356 |
| 704 | 12.6 | 0.2 | 2.52 | 2787 | 0.199 | 69.78 | 61024 | 1.598162 |
| 705 | 14.1 | 0.2 | 2.82 | 2787 | 0.199 | 69.78 | 61024 | 1.78842 |
| 706 | 72 | 0.2 | 14.4 | 2787 | 0.199 | 69.78 | 61024 | 9.132356 |

# APPENDIX T. BATTERY CONDUCTANCE CALCULATIONS

| | | | | BATTERY CONDUCTANCES | | | |
|---|---|---|---|---|---|---|---|
| From | To | width | th | area | length | k (Al) | conductance |
| 201 | 202 | 5.25 | 0.2 | 1.05 | 5.625 | 4.31 | 0.804533333 |
| 201 | 205 | 5.25 | 0.2 | 1.05 | 5.625 | 4.31 | 0.804533333 |
| 201 | 203 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 201 | 206 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 202 | 204 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 202 | 203 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 202 | 206 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 203 | 205 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 203 | 204 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 204 | 206 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 204 | 205 | 3.25 | 0.2 | 0.65 | 5.625 | 4.31 | 0.498044444 |
| 205 | 206 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 301 | 302 | 5 | 0.2 | 1 | 8 | 4.31 | 0.53875 |
| 301 | 305 | 5 | 0.2 | 1 | 8 | 4.31 | 0.53875 |
| 301 | 303 | 6 | 0.2 | 1.2 | 7.5 | 4.31 | 0.6896 |
| 301 | 306 | 6 | 0.2 | 1.2 | 7.5 | 4.31 | 0.6896 |
| 302 | 304 | 5 | 0.2 | 1 | 8 | 4.31 | 0.53875 |
| 302 | 303 | 10 | 0.2 | 2 | 5.5 | 4.31 | 1.567272727 |
| 302 | 306 | 10 | 0.2 | 2 | 5.5 | 4.31 | 1.567272727 |
| 303 | 305 | 10 | 0.2 | 2 | 5.5 | 4.31 | 1.567272727 |
| 303 | 304 | 6 | 0.2 | 1.2 | 7.5 | 4.31 | 0.6896 |
| 304 | 306 | 6 | 0.2 | 1.2 | 7.5 | 4.31 | 0.6896 |
| 304 | 305 | 5 | 0.2 | 1 | 8 | 4.31 | 0.53875 |
| 305 | 306 | 10 | 0.2 | 2 | 5.5 | 4.31 | 1.567272727 |
| 401 | 402 | 5.25 | 0.2 | 1.05 | 5.625 | 4.31 | 0.804533333 |
| 401 | 405 | 5.25 | 0.2 | 1.05 | 5.625 | 4.31 | 0.804533333 |
| 401 | 403 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 401 | 406 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 402 | 404 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 402 | 403 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 402 | 406 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 403 | 405 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| 403 | 404 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 404 | 406 | 3.25 | 0.2 | 0.65 | 6.625 | 4.31 | 0.422867925 |
| 404 | 405 | 5.25 | 0.2 | 1.05 | 5.625 | 4.31 | 0.804533333 |
| 405 | 406 | 8 | 0.2 | 1.6 | 4.25 | 4.31 | 1.622588235 |
| 1500 | 201 | | | 17.1 | 0.2 | 4.31 | 368.505 |
| 1500 | 202 | | | 42 | 0.2 | 4.31 | 905.1 |
| 1500 | 203 | | | 26 | 0.2 | 4.31 | 560.3 |
| 1500 | 204 | | | 17.1 | 0.2 | 4.31 | 368.505 |
| 1500 | 205 | | | 42 | 0.2 | 4.31 | 905.1 |
| 1500 | 206 | | | 26 | 0.2 | 4.31 | 560.3 |
| 1600 | 301 | | | 30 | 0.2 | 4.31 | 646.5 |
| 1600 | 302 | | | 50 | 0.2 | 4.31 | 1077.5 |
| 1600 | 303 | | | 60 | 0.2 | 4.31 | 1293 |
| 1600 | 304 | | | 30 | 0.2 | 4.31 | 646.5 |
| 1600 | 305 | | | 50 | 0.2 | 4.31 | 1077.5 |
| 1600 | 306 | | | 60 | 0.2 | 4.31 | 1293 |
| 1700 | 401 | | | 17.1 | 0.2 | 4.31 | 368.505 |
| 1700 | 402 | | | 42 | 0.2 | 4.31 | 905.1 |
| 1700 | 403 | | | 26 | 0.2 | 4.31 | 560.3 |
| 1700 | 404 | | | 17.1 | 0.2 | 4.31 | 368.505 |
| 1700 | 405 | | | 42 | 0.2 | 4.31 | 905.1 |
| 1700 | 406 | | | 26 | 0.2 | 4.31 | 560.3 |
| 206 | 102 | 3.25 | 7.13 | 23.1725 | 0.225 | 4.31 | 443.8821111 |
| 206 | 104 | 3.25 | 0.435 | 1.41375 | 0.225 | 4.31 | 27.08116667 |
| 206 | 105 | 3.25 | 0.435 | 1.41375 | 0.225 | 4.31 | 27.08116667 |
| 306 | 101 | 6 | 10 | 60 | 0.225 | 4.31 | 1149.333333 |
| 406 | 103 | 3.25 | 7.13 | 23.1725 | 0.225 | 4.31 | 443.8821111 |
| 406 | 106 | 3.25 | 0.435 | 1.41375 | 0.225 | 4.31 | 27.08116667 |
| 406 | 107 | 3.25 | 0.435 | 1.41375 | 0.225 | 4.31 | 27.08116667 |
| 703 | 501 | 7.13 | 7.13 | 50.8369 | 0.225 | 4.31 | 973.8090622 |
| 703 | 502 | 0.435 | 7.13 | 3.10155 | 0.225 | 4.31 | 59.41191333 |
| 703 | 503 | 0.435 | 7.13 | 3.10155 | 0.225 | 4.31 | 59.41191333 |
| 703 | 504 | 0.435 | 0.935 | 0.406725 | 0.225 | 4.31 | 7.791043333 |
| 703 | 505 | 0.435 | 0.935 | 0.406725 | 0.225 | 4.31 | 7.791043333 |
| 703 | 506 | 0.435 | 0.935 | 0.406725 | 0.225 | 4.31 | 7.791043333 |
| 703 | 507 | 0.435 | 0.935 | 0.406725 | 0.225 | 4.31 | 7.791043333 |

# APPENDIX U.    BATTERY MODEL CONDUCTOR DATA ENTRY

```
ëëë Ctrl:Copyëëëëëëëëëëëëë ITAS Conductor Data Entry ëëëëëëëëëëëëëëë ESC:Quit £
¤                                                                            ¤
¤ SqNo FACTOR From    To     Cond. Value  L/R Description                    ¤
¤    1 1      1       101    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    2 1      2       102    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    3 1      3       103    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    4 1      4       104    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    5 1      5       105    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    6 1      6       106    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    7 1      7       107    1000         L   GEOMETRY TO LOWER PLATE NODE    ¤
¤    8 1      8       201    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤    9 1      9       202    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤   10 1      10      203    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤   11 1      11      204    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤   12 1      12      205    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤   13 1      13      206    1000         L   GEOMETRY TO BATTERY A NODE      ¤
¤   14 1      14      301    1000         L   GEOMETRY TO DCS NODE            ¤
¤   15 1      15      302    1000         L   GEOMETRY TO DCS NODE            ¤
¤   16 1      16      303    1000         L   GEOMETRY TO DCS NODE            ¤
¤   17 1      17      304    1000         L   GEOMETRY TO DCS NODE            ¤
¤   18 1      18      305    1000         L   GEOMETRY TO DCS NODE            ¤
àëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëY
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed          PgDn PgUp Home
SHFT-F1Import Column      Shift-F3AutoCHT  Shift-F5Del/Pur                  End
      F1Save/Purge       F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

```
¤   19 1      19      306    1000         L   GEOMETRY TO DCS NODE            ¤
¤   20 1      20      401    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   21 1      21      402    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   22 1      22      403    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   23 1      23      404    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   24 1      24      405    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   25 1      25      406    1000         L   GEOMETRY TO BATTERY B NODE      ¤
¤   26 1      26      501    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   27 1      27      502    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   28 1      28      503    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   29 1      29      504    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   30 1      30      505    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   31 1      31      506    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   32 1      32      506    1000         L   GEOMETRY TO UPPER PLATE         ¤
¤   33 1      33      601    1000         L   GEOMETRY TO STRUCTURE NODE      ¤
¤   34 1      34      602    1000         L   GEOMETRY TO STRUCTURE NODE      ¤
¤   35 1      35      603    1000         L   GEOMETRY TO STRUCTURE NODE      ¤
¤   36 1      36      604    1000         L   GEOMETRY TO STRUCTURE NODE      ¤
àëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëëY
CTRL-F1Import ITAS_NC     ALT-F3AutoMLI    UDC Allowed          PgDn PgUp Home
SHFT-F1Import Column      Shift-F3AutoCHT  Shift-F5Del/Pur                  End
      F1Save/Purge       F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search
```

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 37 | 1 | 37 | 605 | 1000 | L | GEOMETRY TO STRUCTURE NODE |
| 38 | 1 | 38 | 606 | 1000 | L | GEOMETRY TO STRUCTURE NODE |
| 39 | 1 | 39 | 607 | 1000 | L | GEOMETRY TO STRUCTURE NODE |
| 40 | 1 | 40 | 608 | 1000 | L | GEOMETRY TO STRUCTURE NODE |
| 41 | 1 | 41 | 701 | 1000 | L | GEOMETRY TO EPS NODE |
| 42 | 1 | 42 | 702 | 1000 | L | GEOMETRY TO EPS NODE |
| 43 | 1 | 43 | 703 | 1000 | L | GEOMETRY TO EPS NODE |
| 44 | 1 | 44 | 704 | 1000 | L | GEOMETRY TO EPS NODE |
| 45 | 1 | 45 | 705 | 1000 | L | GEOMETRY TO EPS NODE |
| 46 | 1 | 46 | 706 | 1000 | L | GEOMETRY TO EPS NODE |
| 47 | 1 | 201 | 202 | .80453 | L | BATTERY A NODE TO NODE |
| 48 | 1 | 201 | 205 | .80453 | L | BATTERY A NODE TO NODE |
| 49 | 1 | 201 | 203 | .42287 | L | BATTERY A NODE TO NODE |
| 50 | 1 | 201 | 206 | .42287 | L | BATTERY A NODE TO NODE |
| 51 | 1 | 202 | 204 | .42287 | L | BATTERY A NODE TO NODE |
| 52 | 1 | 202 | 203 | 1.62259 | L | BATTERY A NODE TO NODE |
| 53 | 1 | 202 | 206 | 1.62259 | L | BATTERY A NODE TO NODE |
| 54 | 1 | 203 | 205 | 1.62259 | L | BATTERY A NODE TO NODE |

CTRL-FlImport ITAS_NC   ALT-F3AutoMLI   UDC Allowed         PgDn PgUp Home
SHFT-FlImport Column   Shift-F3AutoCHT   Shift-F5Del/Pur          End
    FlSave/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 55 | 1 | 203 | 204 | .42287 | L | BATTERY A NODE TO NODE |
| 56 | 1 | 204 | 206 | .42287 | L | BATTERY A NODE TO NODE |
| 57 | 1 | 204 | 205 | .49804 | L | BATTERY A NODE TO NODE |
| 58 | 1 | 205 | 206 | 1.62259 | L | BATTERY A NODE TO NODE |
| 59 | 1 | 301 | 302 | .53875 | L | DCS NODE TO NODE |
| 60 | 1 | 301 | 305 | .53875 | L | DCS NODE TO NODE |
| 61 | 1 | 301 | 303 | .6896 | L | DCS NODE TO NODE |
| 62 | 1 | 301 | 306 | .6896 | L | DCS NODE TO NODE |
| 63 | 1 | 302 | 304 | .53875 | L | DCS NODE TO NODE |
| 64 | 1 | 302 | 303 | 1.56727 | L | DCS NODE TO NODE |
| 65 | 1 | 302 | 306 | 1.56727 | L | DCS NODE TO NODE |
| 66 | 1 | 303 | 305 | 1.56727 | L | DCS NODE TO NODE |
| 67 | 1 | 303 | 304 | .6896 | L | DCS NODE TO NODE |
| 68 | 1 | 304 | 306 | .6896 | L | DCS NODE TO NODE |
| 69 | 1 | 304 | 305 | .53875 | L | DCS NODE TO NODE |
| 70 | 1 | 305 | 306 | 1.56727 | L | DCS NODE TO NODE |
| 71 | 1 | 401 | 402 | .80453 | L | BATTERY B NODE TO NODE |
| 72 | 1 | 401 | 405 | .80453 | L | BATTERY B NODE TO NODE |

CTRL-FlImport ITAS_NC   ALT-F3AutoMLI   UDC Allowed         PgDn PgUp Home
SHFT-FlImport Column   Shift-F3AutoCHT   Shift-F5Del/Pur          End
    FlSave/Purge     F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 73 | 1 | 401 | 403 | .42287 | L | BATTERY B NODE TO NODE |
| 74 | 1 | 401 | 406 | .42287 | L | BATTERY B NODE TO NODE |
| 75 | 1 | 402 | 404 | .42287 | L | BATTERY B NODE TO NODE |
| 76 | 1 | 402 | 403 | 1.62259 | L | BATTERY B NODE TO NODE |
| 77 | 1 | 402 | 406 | 1.62259 | L | BATTERY B NODE TO NODE |
| 78 | 1 | 403 | 405 | 1.62259 | L | BATTERY B NODE TO NODE |
| 79 | 1 | 403 | 404 | .42287 | L | BATTERY B NODE TO NODE |
| 80 | 1 | 404 | 406 | .42287 | L | BATTERY B NODE TO NODE |
| 81 | 1 | 404 | 405 | .80453 | L | BATTERY B NODE TO NODE |
| 82 | 1 | 405 | 406 | 1.62259 | L | HEAT NODE TO BATTERY A |
| 83 | 1 | 1500 | 201 | 368.5 | L | HEAT NODE TO BATTERY A |
| 84 | 1 | 1500 | 202 | 950.1 | L | HEAT NODE TO BATTERY A |
| 85 | 1 | 1500 | 203 | 560.3 | L | HEAT NODE TO BATTERY A |
| 86 | 1 | 1500 | 204 | 368.5 | L | HEAT NODE TO BATTERY A |
| 87 | 1 | 1500 | 205 | 950.1 | L | HEAT NODE TO BATTERY A |
| 88 | 1 | 1500 | 206 | 560.3 | L | HEAT NODE TO DCS |
| 89 | 1 | 1600 | 301 | 646.5 | L | HEAT NODE TO DCS |
| 90 | 1 | 1600 | 302 | 1077.5 | L | HEAT NODE TO DCS |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|-------------|
| 91 | 1 | 1600 | 303 | 1293 | L | HEAT NODE TO DCS |
| 92 | 1 | 1600 | 304 | 646.5 | L | HEAT NODE TO DCS |
| 93 | 1 | 1600 | 305 | 1077.5 | L | HEAT NODE TO DCS |
| 94 | 1 | 1600 | 306 | 1293 | L | HEAT NODE TO DCS |
| 95 | 1 | 1700 | 401 | 368.51 | L | HEAT NODE TO BATTERY B |
| 96 | 1 | 1700 | 402 | 905.1 | L | HEAT NODE TO BATTERY B |
| 97 | 1 | 1700 | 403 | 560.3 | L | HEAT NODE TO BATTERY B |
| 98 | 1 | 1700 | 404 | 368.51 | L | HEAT NODE TO BATTERY B |
| 99 | 1 | 1700 | 405 | 905.1 | L | HEAT NODE TO BATTERY B |
| 100 | 1 | 1700 | 406 | 560.3 | L | HEAT NODE TO BATTERY B |
| 101 | 1 | 206 | 102 | 443.88 | L | BATTERY A TO LOWER PLATE |
| 102 | 1 | 206 | 104 | 27.08 | L | BATTERY A TO LOWER PLATE |
| 103 | 1 | 206 | 105 | 27.08 | L | BATTERY A TO LOWER PLATE |
| 104 | 1 | 306 | 101 | 1149.3 | L | DCS TO LOWER PLATE |
| 105 | 1 | 406 | 103 | 443.88 | L | BATTERY B TO LOWER PLATE |
| 106 | 1 | 406 | 106 | 27.08 | L | BATTERY B TO LOWER PLATE |
| 107 | 1 | 406 | 107 | 27.08 | L | BATTERY B TO LOWER PLATE |
| 108 | 1 | 703 | 501 | 973.81 | L | EPS TO UPPER PLATE |

| SqNo | FACTOR | From | To | Cond. Value | L/R | Description |
|------|--------|------|-----|-------------|-----|----------------------|
| 109  | 1      | 703  | 502 | 27.08       | L   | EPS TO UPPER PLATE   |
| 110  | 1      | 703  | 503 | 27.08       | L   | EPS TO UPPER PLATE   |
| 111  | 1      | 703  | 504 | 7.791       | L   | EPS TO UPPER PLATE   |
| 112  | 1      | 703  | 505 | 7.791       | L   | EPS TO UPPER PLATE   |
| 113  | 1      | 703  | 506 | 7.791       | L   | EPS TO UPPER PLATE   |
| 114  | 1      | 703  | 507 | 7.791       | L   | EPS TO UPPER PLATE   |

CTRL-F1Import ITAS_NC    ALT-F3AutoMLI    UDC Allowed              PgDn PgUp Home
SHFT-F1Import Column    Shift-F3AutoCHT    Shift-F5Del/Pur                    End
        F1Save/Purge        F2Help F3AutoGen F4Purge F5Delete  F7Mark/UnMark F10Search

# APPENDIX V.   BATTERY THERMAL ANALYSIS RESULTS

```
Öáááááááááááááááááááááááááááááááá PC-ITAS áááááááááááááááááááááááááááááááááááç
•LINE NO.    1 to    18     RESULTS REVIEW                                  °
áááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá1
****************************************************************************
Date: 09/15/94                                          Time: 17:08:37.10
****************************************************************************
================================================================================
                         Thermal Analysis Parameters
================================================================================
  1.  Solution Method:1.Steady-State 2.Transient 3. (1&2).......      1
  2.  Solution Time Step ........(minutes)......................      0.10
  3.  Final Time (minutes);if <0 then no of orbs...............     -1.00
  4.  Starting Temperature ......(Kelvin )....................    300.00
  5.  Temperature Print Interval (minutes)....................       20
  6.  No. of Iterations For Convergence (NLOOP)...............     9999
  7.  Temperature Unit 1:K, 2:C, 3:F, 4:R.....................        2
  8.  Solution Accuracy Parameter (not used)..................      130
  9.  Solution Convergence Parameter (not used)...............     1.30
 10.  Solution Tolerance (ARLXCA, DRLXCA)......................   0.00100
 11.  Transient Solution Stability Factor (not used)...........    0.850
 12.  Include User-Defined Network.......(Y/N).................        Y

   Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu


Öáááááááááááááááááááááááááááááááá PC-ITAS áááááááááááááááááááááááááááááááááááç
•LINE NO.    19 to    36     RESULTS REVIEW                                 °
áááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááááá1
 13.  Print RADK, POWER....................(Y/N).................      N
 14.  Print Transient Time/Temperature...(Y/N).................      N
 15.  Starting Temperatures Forced (No.4)(Y/N).................      N
 16.  Thermal Analyses Without Orbital Loads (Y/N).............      N
 17.  Stand-Alone Thermal Analyzer (ITAS-Format Models)........      N
 18.  No. of Isolated Cavities (RADK files)....................      0


================================================================================


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                         *ITAS THERMAL ANALYSIS*
/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
****************************************************************************
  ITAS ABSORBED HEAT RATES FROM ORBITAL INCIDENT & IR AND UV MARICES
****************************************************************************
****************************************************************************
Date: 09/15/94                                          Time: 17:08:37.10

   Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu
```

**************************************************************************
Date: 09/16/94                                        Time: 10:17:03.10
**************************************************************************

========================================================================
### Thermal Analysis Parameters
========================================================================

1.  Solution Method:1.Steady-State 2.Transient 3. (1&2).......        1
2.  Solution Time Step ........(minutes).......................     0.10
3.  Final Time (minutes);if <0 then no of orbs................    -1.00
4.  Starting Temperature ......(Kelvin )......................   300.00
5.  Temperature Print Interval (minutes)......................       20
6.  No. of Iterations For Convergence (NLOOP).................     9999
7.  Temperature Unit 1:K, 2:C, 3:F, 4:R.......................        2
8.  Solution Accuracy Parameter (not used)....................      130
9.  Solution Convergence Parameter (not used).................     1.30
10. Solution Tolerance (ARLXCA, DRLXCA).......................  0.00100
11. Transient Solution Stability Factor (not used)............    0.850
12. Include User-Defined Network.......(Y/N)..................        Y

·  Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu

13. Print RADK, POWER..................(Y/N)..................     N
14. Print Transient Time/Temperature...(Y/N)..................     N
15. Starting Temperatures Forced (No.4)(Y/N)..................     N
16. Thermal Analyses Without Orbital Loads (Y/N)..............     N
17. Stand-Alone Thermal Analyzer (ITAS-Format Models).........     N
18. No. of Isolated Cavities (RADK files)....................     0


========================================================================


/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
### *ITAS THERMAL ANALYSIS*
/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\
**************************************************************************
ITAS ABSORBED HEAT RATES FROM ORBITAL INCIDENT & IR AND UV MARICES
**************************************************************************
**************************************************************************
Date: 09/16/94                                        Time: 10:17:04.10

   Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu

 CHECKOUT PHASE OF PC-ITAS THERMAL ANALYSIS

 TOTAL CARDS ENCOUNTERED:   2092
 TOTAL THERMAL MASSES USED (W-Min/C)=    7102.07
 TOTAL THERMAL MASSES USED (BTU/F  )=    224.440
====================================================================
 NO. OF THERMAL NODES=          96

 ITAS STEADY-STATE SOLUTION ALGORITHM (SUCCESSIVE POINT ITERATION) PARAMETERS:
 ARLXCA=0.10000E-02, DRLXCA=0.10000E-02 NLOOP=  9999
 *******************************************************************
 ITAS STEADY-STATE SOLUTION (SUCCESSIVE POINT ITERATION)
 NO. OF ITERATIONS=   68 TOTAL INPUT ENERGY (W)=   9.6800
 SYSTEM ENERGY BALANCE (W)=  5.1598      (  53.303    %)
 *******************************************************************
 T   1=    33.71 T    2=    33.73 T    3=    33.73 T    4=    33.74
 T   5=    33.74 T    6=    33.74 T    7=    33.74 T    8=    33.69
 T   9=    33.68 T   10=    33.69 T   11=    33.69 T   12=    33.69

     Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu

 T  13=    33.69 T   14=    33.72 T   15=    33.72 T   16=    33.72
 T  17=    33.72 T   18=    33.72 T   19=    33.69 T   20=    33.70
 T  21=    33.70 T   22=    33.70 T   23=    33.70 T   24=    33.69
 T  25=    33.69 T   26=    33.08 T   27=    33.08 T   28=    33.08
 T  29=    33.08 T   30=    33.08 T   31=    33.08 T   32=    33.08
 T  33=    33.44 T   34=    39.87 T   35=    38.83 T   36=    31.14
 T  37=    30.79 T   38=    33.26 T   39=    33.26 T   40=    28.56
 T  41=    33.00 T   42=    33.00 T   43=    33.97 T   44=    33.00
 T  45=    33.00 T   46=    33.97 T   47=  -273.16 T  101=    33.74
 T 102=    33.74 T  103=    33.74 T  104=    33.74 T  105=    33.74
 T 106=    33.74 T  107=    33.74 T  201=    33.69 T  202=    33.69
 T 203=    33.69 T  204=    33.69 T  205=    33.69 T  206=    33.70
 T 301=    33.72 T  302=    33.72 T  303=    33.72 T  304=    33.72
 T 305=    33.72 T  306=    33.72 T  401=    33.70 T  402=    33.70
 T 403=    33.70 T  404=    33.70 T  405=    33.69 T  406=    33.71
 T 501=    33.08 T  502=    33.08 T  503=    33.08 T  504=    33.08
 T 505=    33.08 T  506=    33.08 T  507=    33.08 T  601=    33.44
 T 602=    39.87 T  603=    38.83 T  604=    31.14 T  605=    30.79

     Use PgDn PgUp Home End        F1Save    F10Search For    ESCQuit/Main Menu

```
T   606=    33.26 T   607=    33.26 T   608=    28.56 T   701=    33.00
T   702=    33.00 T   703=    34.00 T   704=    33.00 T   705=    33.00
T   706=    34.00 T  1500=    33.69 T  1600=    33.72 T  1700=    33.70
```

                    ASCENDING NODE NUMBER : TEMPERATURE
**************************************************************************
ITAS STEADY-STATE SOLUTION (SUCCESSIVE POINT ITERATION)
NO. OF ITERATIONS=   68 TOTAL INPUT ENERGY (W)=  9.6800
SYSTEM ENERGY BALANCE (W)=  5.1598      ( 53.303   %)
**************************************************************************

```
T     1=    33.710 T     2=    33.730 T     3=    33.730 T     4=    33.739
T     5=    33.739 T     6=    33.739 T     7=    33.739 T     8=    33.688
T     9=    33.684 T    10=    33.688 T    11=    33.688 T    12=    33.687
T    13=    33.689 T    14=    33.721 T    15=    33.716 T    16=    33.722
T    17=    33.722 T    18=    33.716 T    19=    33.691 T    20=    33.695
T    21=    33.697 T    22=    33.696 T    23=    33.696 T    24=    33.692
T    25=    33.693 T    26=    33.080 T    27=    33.080 T    28=    33.080
T    29=    33.080 T    30=    33.080 T    31=    33.080 T    32=    33.080
```

```
T    33=    33.439 T    34=    39.867 T    35=    38.828 T    36=    31.140
T    37=    30.790 T    38=    33.259 T    39=    33.260 T    40=    28.561
T    41=    32.996 T    42=    32.996 T    43=    33.972 T    44=    32.996
T    45=    32.996 T    46=    33.966 T    47=  -273.159 T   101=    33.740
T   102=    33.740 T   103=    33.740 T   104=    33.740 T   105=    33.740
T   106=    33.740 T   107=    33.740 T   201=    33.689 T   202=    33.687
T   203=    33.689 T   204=    33.688 T   205=    33.688 T   206=    33.702
T   301=    33.722 T   302=    33.719 T   303=    33.722 T   304=    33.722
T   305=    33.719 T   306=    33.719 T   401=    33.696 T   402=    33.697
T   403=    33.697 T   404=    33.697 T   405=    33.695 T   406=    33.706
T   501=    33.080 T   502=    33.080 T   503=    33.080 T   504=    33.080
T   505=    33.080 T   506=    33.080 T   507=    33.080 T   601=    33.440
T   602=    39.870 T   603=    38.830 T   604=    31.140 T   605=    30.790
T   606=    33.260 T   607=    33.260 T   608=    28.560 T   701=    33.000
T   702=    33.000 T   703=    34.000 T   704=    33.000 T   705=    33.000
T   706=    34.000 T  1500=    33.691 T  1600=    33.722 T  1700=    33.698
```
                    ASCENDING NODE NUMBER : IMPRESSED Q
```
Q     1=     0.000 Q     2=     0.000 Q     3=     0.000 Q     4=     0.000
```

¤ Tempááááç ÖááNode                              Öáááááá áPlot Flags (X or Y) ¤

| Time | | 103 | 104 | 105 | 106 | 107 | 201 | 202 |
|------|---|-----|-----|-----|-----|-----|-----|-----|
| 63.95 | â | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 65.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 67.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 69.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.72 | 33.71 |
| 71.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.72 | 33.71 |
| 73.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.72 | 33.71 |
| 75.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 77.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 79.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 81.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 83.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 85.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 87.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 89.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 91.95 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 92.33 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |
| 92.33 | | 33.74 | 33.74 | 33.74 | 33.74 | 33.74 | 33.71 | 33.71 |

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S-F3Save ASCII
FlPlot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

¤ Tempááááç ÖááNode                              Öáááááá áPlot Flags (X or Y) ¤

| Time | | 203 | 204 | 205 | 206 | 301 | 302 | 303 |
|------|---|-----|-----|-----|-----|-----|-----|-----|
| 63.95 | â | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 65.95 | | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 | 33.72 |
| 67.95 | | 33.71 | 33.71 | 33.71 | 33.72 | 33.73 | 33.72 | 33.73 |
| 69.95 | | 33.72 | 33.71 | 33.71 | 33.72 | 33.73 | 33.73 | 33.73 |
| 71.95 | | 33.72 | 33.72 | 33.72 | 33.72 | 33.73 | 33.73 | 33.73 |
| 73.95 | | 33.72 | 33.72 | 33.72 | 33.72 | 33.73 | 33.73 | 33.73 |
| 75.95 | | 33.72 | 33.72 | 33.71 | 33.72 | 33.73 | 33.72 | 33.73 |
| 77.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 79.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 81.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 83.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 85.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 87.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 89.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 91.95 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 92.33 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |
| 92.33 | | 33.71 | 33.71 | 33.71 | 33.71 | 33.72 | 33.72 | 33.72 |

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S-F3Save ASCII
FlPlot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

| Time | 304 | 305 | 306 | 401 | 402 | 403 | 404 |
|------|-----|-----|-----|-----|-----|-----|-----|
| 63.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 65.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 67.95 | 33.73 | 33.72 | 33.73 | 33.71 | 33.72 | 33.71 | 33.71 |
| 69.95 | 33.73 | 33.73 | 33.73 | 33.72 | 33.72 | 33.72 | 33.72 |
| 71.95 | 33.73 | 33.73 | 33.73 | 33.72 | 33.72 | 33.72 | 33.72 |
| 73.95 | 33.73 | 33.73 | 33.73 | 33.72 | 33.72 | 33.72 | 33.72 |
| 75.95 | 33.73 | 33.72 | 33.72 | 33.72 | 33.72 | 33.72 | 33.72 |
| 77.95 | 33.73 | 33.72 | 33.72 | 33.71 | 33.72 | 33.72 | 33.72 |
| 79.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 81.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 83.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 85.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 87.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 89.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 91.95 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 92.33 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |
| 92.33 | 33.72 | 33.72 | 33.72 | 33.71 | 33.71 | 33.71 | 33.71 |

Tempáááá¢  ÖááNode                                    Öáááááá Plot Flags (X or Y)

S-F3Save ASCII
F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

Tempáááá¢  ÖááNode                                    Öáááááá Plot Flags (X or Y)

| Time | 405 | 406 | 501 | 502 | 503 | 504 | 505 |
|------|-----|-----|-----|-----|-----|-----|-----|
| 63.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 65.95 | 33.71 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 67.95 | 33.71 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 69.95 | 33.71 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 71.95 | 33.72 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 73.95 | 33.72 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 75.95 | 33.72 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 77.95 | 33.71 | 33.72 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 79.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 81.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 83.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 85.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 87.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 89.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 91.95 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 92.33 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |
| 92.33 | 33.71 | 33.71 | 33.08 | 33.08 | 33.08 | 33.08 | 33.08 |

S-F3Save ASCII
F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

 TOTAL SURFACES IN THIS MODEL=   46
*********************************************************************************
                    PC-ITAS Summary of Input Parameters
            These parameters reflect the latest values assigned to them
                          prior to any computation
*********************************************************************************
Date: 09/17/94                                          Time: 18:30:45.10
*********************************************************************************
================================================================================
                    Thermal Analysis Parameters
================================================================================
  1.  Solution Method:1.Steady-State 2.Transient 3. (1&2).......        2
  2.  Solution Time Step ........(minutes)......................      0.10
  3.  Final Time (minutes);if <0 then no of orbs...............     -1.00
  4.  Starting Temperature ......(Kelvin )......................    300.00
  5.  Temperature Print Interval (minutes)......................       20
  6.  No. of Iterations For Convergence (NLOOP).................     9999
  7.  Temperature Unit 1:K, 2:C, 3:F, 4:R.......................        2

    Use PgDn PgUp Home End         F1Save   F10Search For    ESCQuit/Main Menu

  8.  Solution Accuracy Parameter (not used)....................      130
  9.  Solution Convergence Parameter (not used).................     1.30
 10.  Solution Tolerance (ARLXCA, DRLXCA).......................  0.00100
 11.  Transient Solution Stability Factor (not used)............    0.850
 12.  Include User-Defined Network.......(Y/N)..................        Y
 13.  Print RADK, POWER..................(Y/N)..................        N
 14.  Print Transient Time/Temperature...(Y/N)..................        N
 15.  Starting Temperatures Forced (No.4)(Y/N)..................        N
 16.  Thermal Analyses Without Orbital Loads (Y/N)..............        N
 17.  Stand-Alone Thermal Analyzer (ITAS-Format Models).........        N
 18.  No. of Isolated Cavities (RADK files).....................        0


================================================================================


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                       *ITAS THERMAL ANALYSIS*
/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\/\

    Use PgDn PgUp Home End         F1Save   F10Search For    ESCQuit/Main Menu

Temp Node

| Time | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|---|---|---|---|---|---|---|---|
| 0.00 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 |
| 1.95 | 26.93 | 26.93 | 26.94 | 26.93 | 26.94 | 27.10 | 26.99 |
| 3.95 | 27.06 | 27.06 | 27.06 | 27.06 | 27.07 | 27.23 | 27.19 |
| 5.95 | 27.18 | 27.18 | 27.19 | 27.18 | 27.19 | 27.35 | 27.37 |
| 7.95 | 27.30 | 27.31 | 27.31 | 27.30 | 27.31 | 27.47 | 27.56 |
| 9.95 | 27.42 | 27.42 | 27.43 | 27.42 | 27.43 | 27.58 | 27.73 |
| 11.95 | 27.54 | 27.54 | 27.54 | 27.54 | 27.54 | 27.69 | 27.91 |
| 13.95 | 27.65 | 27.65 | 27.65 | 27.65 | 27.66 | 27.80 | 28.07 |
| 15.95 | 27.76 | 27.76 | 27.77 | 27.76 | 27.77 | 27.91 | 28.23 |
| 17.95 | 27.87 | 27.87 | 27.88 | 27.87 | 27.88 | 28.02 | 28.39 |
| 19.95 | 27.98 | 27.98 | 27.98 | 27.98 | 27.98 | 28.12 | 28.54 |
| 21.95 | 28.08 | 28.08 | 28.09 | 28.08 | 28.09 | 28.22 | 28.68 |
| 23.95 | 28.19 | 28.19 | 28.19 | 28.19 | 28.19 | 28.32 | 28.82 |
| 25.95 | 28.29 | 28.29 | 28.29 | 28.29 | 28.29 | 28.42 | 28.96 |
| 27.95 | 28.38 | 28.39 | 28.39 | 28.38 | 28.39 | 28.51 | 29.09 |
| 29.95 | 28.48 | 28.48 | 28.48 | 28.48 | 28.49 | 28.61 | 29.22 |
| 31.95 | 28.57 | 28.58 | 28.58 | 28.57 | 28.58 | 28.70 | 29.34 |

Plot Flags (X or Y)

S-F3Save ASCII

F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

PgDn PgUp Home End   ITAS Time ( ) / Temperature ( ) Results                    ^

Tempáááá¢ ÖááNode                         Öáááááá́Plot Flags (X or Y)

| Time | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|------|------|------|------|------|------|------|------|
| 0.00 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 |
| 1.95 | 26.99 | 27.00 | 26.99 | 26.99 | 27.15 | 26.93 | 26.94 |
| 3.95 | 27.18 | 27.19 | 27.19 | 27.18 | 27.34 | 27.06 | 27.07 |
| 5.95 | 27.37 | 27.38 | 27.38 | 27.37 | 27.52 | 27.18 | 27.19 |
| 7.95 | 27.55 | 27.56 | 27.56 | 27.55 | 27.70 | 27.30 | 27.31 |
| 9.95 | 27.73 | 27.74 | 27.73 | 27.73 | 27.87 | 27.42 | 27.43 |
| 11.95 | 27.90 | 27.91 | 27.91 | 27.90 | 28.04 | 27.54 | 27.55 |
| 13.95 | 28.07 | 28.08 | 28.07 | 28.07 | 28.20 | 27.65 | 27.66 |
| 15.95 | 28.23 | 28.24 | 28.23 | 28.23 | 28.35 | 27.77 | 27.77 |
| 17.95 | 28.38 | 28.39 | 28.39 | 28.38 | 28.50 | 27.88 | 27.88 |
| 19.95 | 28.53 | 28.54 | 28.54 | 28.53 | 28.65 | 27.98 | 27.99 |
| 21.95 | 28.68 | 28.69 | 28.68 | 28.68 | 28.79 | 28.09 | 28.10 |
| 23.95 | 28.82 | 28.83 | 28.82 | 28.82 | 28.93 | 28.19 | 28.20 |
| 25.95 | 28.96 | 28.96 | 28.96 | 28.96 | 29.06 | 28.29 | 28.30 |
| 27.95 | 29.09 | 29.10 | 29.09 | 29.09 | 29.19 | 28.39 | 28.40 |
| 29.95 | 29.22 | 29.22 | 29.22 | 29.22 | 29.31 | 28.49 | 28.49 |
| 31.95 | 29.34 | 29.35 | 29.34 | 29.34 | 29.43 | 28.58 | 28.59 |

S-F3Save ASCII
F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

Tempáááá¢ ÖááNode                                              ÖáááááPlot Flags (X or Y) ¤

| Time | 22 | 23 | 24 | 25 | 26 | 27 | 28 |
|---|---|---|---|---|---|---|---|
| 0.00 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 | 26.84 |
| 1.95 | 26.94 | 26.93 | 26.93 | 27.10 | 33.08 | 33.08 | 33.08 |
| 3.95 | 27.06 | 27.06 | 27.06 | 27.23 | 33.08 | 33.08 | 33.08 |
| 5.95 | 27.19 | 27.18 | 27.18 | 27.35 | 33.08 | 33.08 | 33.08 |
| 7.95 | 27.31 | 27.31 | 27.31 | 27.47 | 33.08 | 33.08 | 33.08 |
| 9.95 | 27.43 | 27.42 | 27.43 | 27.58 | 33.08 | 33.08 | 33.08 |
| 11.95 | 27.54 | 27.54 | 27.54 | 27.70 | 33.08 | 33.08 | 33.08 |
| 13.95 | 27.66 | 27.66 | 27.66 | 27.81 | 33.08 | 33.08 | 33.08 |
| 15.95 | 27.77 | 27.77 | 27.77 | 27.91 | 33.08 | 33.08 | 33.08 |
| 17.95 | 27.88 | 27.88 | 27.88 | 28.02 | 33.08 | 33.08 | 33.08 |
| 19.95 | 27.99 | 27.98 | 27.98 | 28.12 | 33.08 | 33.08 | 33.08 |
| 21.95 | 28.09 | 28.09 | 28.09 | 28.23 | 33.08 | 33.08 | 33.08 |
| 23.95 | 28.19 | 28.19 | 28.19 | 28.33 | 33.08 | 33.08 | 33.08 |
| 25.95 | 28.29 | 28.29 | 28.29 | 28.42 | 33.08 | 33.08 | 33.08 |
| 27.95 | 28.39 | 28.39 | 28.39 | 28.52 | 33.08 | 33.08 | 33.08 |
| 29.95 | 28.49 | 28.49 | 28.49 | 28.61 | 33.08 | 33.08 | 33.08 |
| 31.95 | 28.58 | 28.58 | 28.58 | 28.70 | 33.08 | 33.08 | 33.08 |

S-F3Save ASCII

F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

Tempááááȼ ÖáàNode                    Öáááááá Plot Flags (X or Y)

| Time | 8 | 9 | 10 | 11 | 12 | 13 | 14 |
|------|-------|-------|-------|-------|-------|-------|-------|
| 0.00 | 30.67 | 30.67 | 30.67 | 30.67 | 30.67 | 30.73 | 31.73 |
| 1.95 | 30.68 | 30.67 | 30.68 | 30.67 | 30.68 | 30.73 | 31.74 |
| 3.95 | 30.68 | 30.66 | 30.68 | 30.68 | 30.68 | 30.73 | 31.74 |
| 5.95 | 30.68 | 30.66 | 30.69 | 30.68 | 30.68 | 30.72 | 31.75 |
| 7.95 | 30.69 | 30.66 | 30.69 | 30.68 | 30.68 | 30.72 | 31.75 |
| 9.95 | 30.69 | 30.66 | 30.70 | 30.69 | 30.68 | 30.72 | 31.75 |
| 11.95 | 30.70 | 30.66 | 30.70 | 30.69 | 30.69 | 30.72 | 31.76 |
| 13.95 | 30.70 | 30.66 | 30.70 | 30.69 | 30.69 | 30.72 | 31.76 |
| 15.95 | 30.70 | 30.66 | 30.71 | 30.69 | 30.69 | 30.72 | 31.76 |
| 17.95 | 30.70 | 30.66 | 30.71 | 30.70 | 30.69 | 30.72 | 31.76 |
| 19.95 | 30.71 | 30.66 | 30.71 | 30.70 | 30.69 | 30.72 | 31.76 |
| 21.95 | 30.71 | 30.66 | 30.71 | 30.70 | 30.70 | 30.72 | 31.76 |
| 23.95 | 30.71 | 30.66 | 30.72 | 30.70 | 30.70 | 30.72 | 31.76 |
| 25.95 | 30.71 | 30.66 | 30.72 | 30.70 | 30.70 | 30.72 | 31.76 |
| 27.95 | 30.71 | 30.66 | 30.72 | 30.70 | 30.70 | 30.72 | 31.76 |
| 29.95 | 30.72 | 30.66 | 30.72 | 30.71 | 30.70 | 30.72 | 31.76 |
| 31.95 | 30.72 | 30.66 | 30.72 | 30.71 | 30.70 | 30.73 | 31.76 |

S-F3Save ASCII

F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

¤ Tempáááá¢  Öáá Node

Öáááááá Plot Flags (X or Y)

| Time | 15 | 16 | 17 | 18 | 19 | 20 | 21 |
|------|------|------|------|------|------|------|------|
| 0.00 | 31.72 | 31.73 | 31.73 | 31.72 | 31.74 | 30.68 | 30.69 |
| 1.95 | 31.72 | 31.74 | 31.74 | 31.72 | 31.71 | 30.69 | 30.70 |
| 3.95 | 31.72 | 31.75 | 31.75 | 31.72 | 31.69 | 30.69 | 30.70 |
| 5.95 | 31.71 | 31.76 | 31.75 | 31.71 | 31.67 | 30.69 | 30.71 |
| 7.95 | 31.71 | 31.76 | 31.76 | 31.71 | 31.65 | 30.70 | 30.71 |
| 9.95 | 31.71 | 31.77 | 31.76 | 31.71 | 31.64 | 30.70 | 30.72 |
| 11.95 | 31.70 | 31.77 | 31.77 | 31.70 | 31.63 | 30.70 | 30.72 |
| 13.95 | 31.70 | 31.77 | 31.77 | 31.70 | 31.62 | 30.70 | 30.73 |
| 15.95 | 31.70 | 31.78 | 31.77 | 31.70 | 31.61 | 30.71 | 30.73 |
| 17.95 | 31.70 | 31.78 | 31.77 | 31.70 | 31.61 | 30.71 | 30.73 |
| 19.95 | 31.69 | 31.78 | 31.78 | 31.69 | 31.60 | 30.71 | 30.74 |
| 21.95 | 31.69 | 31.78 | 31.78 | 31.69 | 31.60 | 30.71 | 30.74 |
| 23.95 | 31.69 | 31.78 | 31.78 | 31.69 | 31.59 | 30.72 | 30.74 |
| 25.95 | 31.69 | 31.78 | 31.78 | 31.69 | 31.59 | 30.72 | 30.75 |
| 27.95 | 31.68 | 31.78 | 31.78 | 31.68 | 31.59 | 30.72 | 30.75 |
| 29.95 | 31.68 | 31.78 | 31.78 | 31.68 | 31.58 | 30.72 | 30.75 |
| 31.95 | 31.68 | 31.78 | 31.78 | 31.68 | 31.58 | 30.73 | 30.75 |

S-F3Save ASCII

F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

.186

Tempáááá¢ ÖááNode

Öáááááá áPlot Flags (X or Y)

| Time  | 22    | 23    | 24    | 25    | 26    | 27    | 28    |
|-------|-------|-------|-------|-------|-------|-------|-------|
| 0.00  | 30.68 | 30.68 | 30.68 | 30.74 | 33.08 | 33.08 | 33.08 |
| 1.95  | 30.69 | 30.69 | 30.68 | 30.74 | 33.08 | 33.08 | 33.08 |
| 3.95  | 30.70 | 30.70 | 30.67 | 30.74 | 33.08 | 33.08 | 33.08 |
| 5.95  | 30.70 | 30.70 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 7.95  | 30.71 | 30.70 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 9.95  | 30.71 | 30.71 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 11.95 | 30.71 | 30.71 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 13.95 | 30.72 | 30.72 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 15.95 | 30.72 | 30.72 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 17.95 | 30.72 | 30.72 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 19.95 | 30.73 | 30.73 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 21.95 | 30.73 | 30.73 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 23.95 | 30.73 | 30.73 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 25.95 | 30.74 | 30.74 | 30.67 | 30.73 | 33.08 | 33.08 | 33.08 |
| 27.95 | 30.74 | 30.74 | 30.67 | 30.74 | 33.08 | 33.08 | 33.08 |
| 29.95 | 30.74 | 30.74 | 30.67 | 30.74 | 33.08 | 33.08 | 33.08 |
| 31.95 | 30.74 | 30.74 | 30.68 | 30.74 | 33.08 | 33.08 | 33.08 |

S-F3Save ASCII

F1Plot  F2Help  F3Save Binary  F4SelPlot  F8PageLeft  F9PageRight  ESCQuit

**APPENDIX W.   BATTERY THERMAL MODEL (INWARD VIEWING)**

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